

**EPA Superfund
Record of Decision:**

**MASTER DISPOSAL SERVICE LANDFILL
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BROOKFIELD, WI
09/26/1990**

09/06/90
REGIONAL ADMINISTRATOR
US ENVIRONMENTAL PROTECTION AGENCY, REGION V

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1.0. SITE NAME, LOCATION, AND DESCRIPTION

THE MASTER DISPOSAL SERVICE LANDFILL (MDSL) SITE IS LOCATED AT 19900 WEST CAPITOL DRIVE (WISCONSIN ROUTE 190), TOWN OF BROOKFIELD, WAUKESHA COUNTY, WISCONSIN. THE PROPERTY IS SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 NORTH, RANGE 20 EAST OF THE WAUKESHA QUADRANGLE, WISCONSIN. (SEE FIGURE 1-1). THE SITE IS BOUNDED BY WISCONSIN ROUTE 190 TO THE SOUTH, AND OTHERWISE IS SURROUNDED BY WETLANDS. THE WETLANDS LOCATED AROUND THE LANDFILL ARE PRIVATELY OWNED PARCELS OF LAND. THE FOX RIVER IS LOCATED APPROXIMATELY 300 FEET TO THE WEST. THE SITE VICINITY MAP IS ILLUSTRATED IN FIGURE 1-2.

THE MDSL SITE IS LOCATED IN THE MARSHY FLOODPLAIN OF THE FOX RIVER AND IS PARTIALLY SURROUNDED BY DRAINAGE CHANNELS WHICH DISCHARGE TO THE RIVER. THE SITE OCCUPIES APPROXIMATELY 26 ACRES OF THE 40-ACRE PARCEL. THE LANDFILLING OPERATIONS HAVE CREATED A RAISED PLATEAU, CONFINED BY PERIMETER BERMS, THAT IS SURROUNDED BY FLAT-LYING LOWLANDS.

THE 1980 POPULATION OF THE AREA SURROUNDING THE LANDFILL (CENSUS TRACT 2008) IS APPROXIMATELY 10,440, AND THE AREA IS EXPERIENCING RAPID GROWTH. OF THE TOTAL, APPROXIMATELY 8,530 PERSONS ARE RESIDENTS OF THE CITY OF BROOKFIELD. THE CITY OF BROOKFIELD IS A WESTERN SUBURB OF THE CITY OF MILWAUKEE. IT IS A HEAVILY URBANIZED AREA LOCATED APPROXIMATELY 3/4 MILE EAST OF THE SITE.

THE NEAREST RESIDENTIAL WELL IS APPROXIMATELY ONE MILE TO THE SOUTH OF THE SITE. GROUNDWATER FLOW IS PRIMARILY TO THE SOUTH-SOUTHWEST. WITHIN THE WETLANDS SURROUNDING THE SITE, A SUBSTANTIAL AMOUNT OF PEAT IS ENCOUNTERED. THE DOLOMITE AQUIFER BEGINS AT APPROXIMATELY A DEPTH OF 55 FEET BELOW THE GROUND SURFACE. WITHIN THE UNCONSOLIDATED GLACIAL TILL ARE TWO SAND AND GRAVEL AQUIFER UNITS AT DEPTHS OF 15 AND 35 FEET.

THE MDSL SITE LIES WITHIN A PRIMARY ENVIRONMENTAL CORRIDOR, AS DEFINED BY THE SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION (SEWRPC). SEWRPC DEFINES THOSE AREAS IN SOUTHEAST WISCONSIN THAT HAVE THE HIGHEST CONCENTRATIONS OF NATURAL, RECREATIONAL, HISTORIC, AND SCENIC RESOURCES AS "ENVIRONMENTAL CORRIDORS". A PRIMARY ENVIRONMENTAL CORRIDOR IS FURTHER DEFINED AS BEING AT LEAST 400 ACRES IN SIZE, TWO MILES IN LENGTH, AND 200 FEET IN WIDTH. RESOURCES CONTRIBUTING TO THE AREA'S RANKING AS A PRIMARY ENVIRONMENTAL CORRIDOR INCLUDE THE FOX RIVER, THE WETLANDS, AND WILDLIFE HABITAT AREAS. THERE ARE NO KNOWN RECORDS OF ENDANGERED OR THREATENED ANIMAL OR PLANT SPECIES IN OR SURROUNDING THE SITE AREA.

THE MDSL SITE IS UNDERLAIN BY REWORKED GLACIAL DRIFT (ALLUVIUM) AND GLACIAL TILL. THIS GLACIAL MATERIAL IS UNCONSOLIDATED AND RESTS ATOP THE NIAGARA DOLOMITE, A CONSOLIDATED SILURIAN UNIT 300 TO 700 FEET THICK IN THE VICINITY OF THE SITE. BENEATH THE NIAGARA DOLOMITE LIES THE MAQUOKETA SHALE AND ORDOVICIAN/CAMBRIAN SANDSTONES AND DOLOMITES. BENEATH THESE UNITS LIES THE PRECAMBRIAN BASEMENT BEDROCK.

THERE ARE TWO AQUIFER SYSTEMS AT THE MDSL SITE: AN UPPER UNCONFINED AQUIFER CONSISTING OF THE GLACIAL TILL AND THE NIAGARA DOLOMITE FORMATION; AND A DEEPER CONFINED AQUIFER BENEATH THE MAQUOKETA SHALE CONSISTING OF THE ORDOVICIAN/CAMBRIAN SANDSTONE FORMATION.

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2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

THE MDSL SITE WAS OPERATED FROM 1967 UNTIL 1982 WHEN IT WAS PARTIALLY CLOSED. AT THAT TIME, WASTES NO LONGER WERE RECEIVED FOR DISPOSAL WITH THE EXCEPTION OF WOOD WASTES WHICH WERE BURNED IN A CONTROLLED AIR-PIT BURNER KNOWN AS AN AIR CURTAIN DESTRUCTOR. THE ASH FROM THIS OPERATION WAS DISPOSED OF ON-SITE. DURING THE ACTIVE LIFE OF THE LANDFILL (1967-1982), DISPOSAL OF INDUSTRIAL AND NON-INDUSTRIAL SOLID WASTES AND DRUMMED LIQUIDS AND SOLIDS OCCURRED ON SITE.

DURING THE FALL OF 1966, THE SITE WAS PURCHASED BY MASTER DISPOSAL, INC. AND BEGAN ITS OPERATION AS MDSL. WASTE WAS INITIALLY ACCEPTED IN 1967.

IN APRIL 1967, AFTER THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR) RECEIVED LEGISLATIVE AUTHORITY TO REGULATE SOLID WASTE FACILITIES, THE WDNR INSPECTED THE MDSL FACILITY. AT THAT TIME, THE WDNR NOTED THAT THE SITE WAS LOCATED ENTIRELY IN A SWAMPY, PEAT AREA. THE WDNR SUBSEQUENTLY ADVISED MASTER DISPOSAL, INC. THAT ADEQUATE DIKING BE MAINTAINED. THE WDNR ALSO CHOSE AT THAT TIME NOT TO LICENSE THE SITE DUE TO THE POOR SETTING OF THE SITE. THE WDNR ROUTINELY INSPECTED THE SITE DURING THE YEARS OF THE SITE'S OPERATION.

A WDNR INSPECTION IN AUGUST 1973, INDICATED THAT THE ONSITE OPERATIONS CONSISTED PRIMARILY OF INDUSTRIAL WASTE DISPOSAL. FOUNDRY SANDS AND SLAGS CONSTITUTE THE LARGEST CLASS OF WASTES ACCEPTED FOR DISPOSAL. SOME EVIDENCE OF HAZARDOUS WASTE (INCLUDING INKS, SLUDGES, SOLVENTS, AND OTHER INDUSTRIAL COMPOUNDS) REPORTEDLY WAS PRESENT AT THE SITE.

THE WDNR PERFORMED APPROXIMATELY 19 INSPECTIONS OF THE MDSL SITE DURING THE PERIOD FROM DECEMBER 1976, THOUGH AUGUST 1977. THE INSPECTIONS GENERALLY CONSISTED OF VISUAL OBSERVATIONS OF DISPOSAL OPERATIONS IN THE INDUSTRIAL WASTE DISPOSAL AREA, WOOD BURNING AREA, REFUSE DISPOSAL AREA, AND SALVAGE AREA. MOST WDNR INSPECTION REPORTS NOTED THAT HAZARDOUS SUBSTANCES WERE BEING ACCEPTED. A SUMMARY REPORT OF THE WDNR SITE INSPECTIONS NOTED THAT OPERATIONAL VIOLATIONS INCLUDED THE FOLLOWING:

- ! CONTINUOUS OPEN BURNING,
- ! INADEQUATE WASTE COVERING,
- ! LACK OF SURFACE WATER DRAINAGE,
- ! ACCEPTANCE OF SOME HAZARDOUS WASTES, AND
- ! DEPOSITION OF WASTE MATERIALS DIRECTLY INTO PONDED WATERS.

UNDER CONTRACT TO THE SITE OWNER, WARZYN ENGINEERING, INC. COMPLETED A STUDY IN JUNE 1977, WHICH ASSESSED THE HYDROGEOLOGIC AND GEOTECHNICAL FEASIBILITY OF CONTINUED DISPOSAL OPERATIONS AT MDSL. WARZYN RECOMMENDED A PHASED ABANDONMENT OVER TIME BASED ON THE POOR SITE SETTING, POTENTIAL INCREASE OF CONTAMINANTS TO GROUND AND SURFACE WATERS, LACK OF ON-SITE BORROW MATERIALS, AND DIFFICULT OPERATING CONDITIONS.

IN AUGUST 1977, THE WDNR AND THE STATE DEPARTMENT OF JUSTICE (DOJ) ENTERED INTO A STIPULATED AGREEMENT WITH MASTER DISPOSAL CORPORATION. AS A RESULT, A STATE LICENSE WAS ISSUED; HOWEVER, THE AGREEMENT CALLED FOR SITE ABANDONMENT WITHIN 2-1/2 YEARS AS WELL AS THE DEVELOPMENT OF A GROUNDWATER MONITORING PROGRAM AT THE SITE.

BY 1982, MDSL WAS PARTIALLY CLOSED. THE ONLY KNOWN WASTES WHICH WERE RECEIVED AFTER PARTIAL CLOSURE WERE WOOD WASTES WHICH WERE BURNED IN THE AIR CURTAIN DESTRUCTOR; THE ASH FROM THE BURNING WAS DISPOSED OF ON SITE. MDSL CEASED THIS ACTIVITY AND CLOSED IN 1985.

IN 1984, US EPA PLACED THE MDSL SITE ON THE NATIONAL PRIORITIES LIST (NPL). IN 1985, US EPA SENT NOTICE LETTERS TO POTENTIALLY RESPONSIBLE PARTIES (PRPS) INFORMING THEM OF AN OPPORTUNITY TO ENGAGE IN NEGOTIATIONS WITH THE AGENCY OVER THE NEED TO EVALUATE EXTENT OF CONTAMINATION AT THE MDSL SITE. IN 1986, APPROXIMATELY 20 PRPS ENTERED INTO AN AGREEMENT WITH US EPA AND WDNR FOR THE PURPOSE OF PERFORMING THIS STUDY.

THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WAS PERFORMED BY THE PRPS WHO WERE A PARTY TO THE CONSENT ORDER. A GOAL OF THE RI/FS WAS TO DETERMINE THE EFFECT OF THE MDSL SITE ON THE SURROUNDING ENVIRONMENT THROUGH THE COLLECTION OF VARIOUS SAMPLES (E.G. - SURFACE WATER, GROUNDWATER, ETC.) RI SAMPLING RESULTS SHOWED THAT THE MDSL SITE HAS HAD DEMONSTRABLE NEGATIVE EFFECTS ON BOTH THE NEARBY GROUNDWATER AND SURFACE WATER. AN FS REPORT TO IDENTIFY REMEDIAL ACTION ALTERNATIVES FOR THE MDSL SITE WAS COMPLETED BY THE PRPS IN JUNE 1990.

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3.0. COMMUNITY RELATIONS

IN 1986, A PUBLIC MEETING WAS HELD AT THE BROOKFIELD CITY HALL AS A "KICKOFF" TO THE PRP-LEAD RI/FS PROCESS. THE RI/FS REPORT AND THE PROPOSED PLAN FOR THE MASTER DISPOSAL SERVICE LANDFILL WERE RELEASED TO THE PUBLIC FOR COMMENT ON JULY 9, 1990. THESE TWO DOCUMENTS WERE MADE AVAILABLE TO THE PUBLIC IN BOTH THE ADMINISTRATIVE RECORD AND AN INFORMATION REPOSITORY MAINTAINED AT THE US EPA DOCKET ROOM IN REGION V AND AT THE BROOKFIELD LIBRARY. ANOTHER REPOSITORY WAS ESTABLISHED AT THE BROOKFIELD CITY HALL. THE NOTICE OF AVAILABILITY FOR THESE TWO DOCUMENTS AND THE SCHEDULED JULY 16, 1990 PUBLIC MEETING WAS PUBLISHED IN THE

MILWAUKEE JOURNAL ON JUNE 27, 1990. A PUBLIC COMMENT PERIOD ON THE DOCUMENTS WAS INITIALLY SET FOR JULY 9, 1990 TO AUGUST 8, 1990. HOWEVER, IN RESPONSE TO A REQUEST FOR AN EXTENSION OF THE COMMENT PERIOD, US EPA EXTENDED THE COMMENT PERIOD UNTIL SEPTEMBER 7, 1990. ON JULY 16, 1990, USEPA CONDUCTED A PUBLIC MEETING AT THE BROOKFIELD CITY HALL CONCERNING THE PROPOSED PLAN. WRITTEN AND ORAL COMMENTS WERE ACCEPTED. AT THIS MEETING, REPRESENTATIVES FROM US EPA AND WDNr ANSWERED QUESTIONS CONCERNING PROBLEMS AT THE SITE AND THE REMEDIAL ALTERNATIVES UNDER CONSIDERATION. RESPONSES TO THE COMMENTS RECEIVED DURING THE MEETING AS WELL AS DURING THE PUBLIC COMMENT PERIOD ARE INCLUDED IN THE RESPONSIVENESS SUMMARY, WHICH IS PART OF THIS ROD.

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4.0. SCOPE AND ROLE OF OPERABLE UNIT

THE ENVIRONMENTAL SETTING AT THE MDSL SITE CONTRIBUTES TO THE COMPLEXITY OF ENVIRONMENTAL PROBLEMS. AS A RESULT, USEPA ORGANIZED THE WORK INTO TWO OPERABLE UNITS (OUS). THIS ROD ADDRESSES THE FIRST OF TWO PLANNED OPERABLE UNITS FOR THE SITE. THE OPERABLE UNITS ARE AS FOLLOWS:

OU ONE: SOURCE CONTROL - CONTAINMENT OF THE WASTE MASS CONSISTING OF A CAP ON THE SITE TO PREVENT INFILTRATION OF WATER THROUGH THE LANDFILL. IN ADDITION, SINCE GROUNDWATER IS BELIEVED TO BE IN DIRECT CONTACT WITH THE WASTE MATERIALS, A GROUNDWATER CONTAINMENT SYSTEM TO CONTROL THE MIGRATION OF THE CONTAMINANT PLUME IS REQUIRED.

OU TWO: THE SECOND OF TWO PLANNED OPERABLE UNITS WILL FOCUS ON THE RESTORATION OF THE GROUNDWATER (BOTH UPPER ALLUVIUM AQUIFER AS WELL AS THE DOLOMITE AQUIFER WHICH UNDERLIES THE ALLUVIUM) TO COMPLY WITH STATE AND FEDERAL ARARS, AND ON IMPACT TO THE WETLANDS AND THE FOX RIVER AND THE ENVIRONMENT. (US EPA AND WDNr WILL ISSUE A SUBSEQUENT PROPOSED PLAN WHEN THEY DETERMINE THE RECOMMENDED OPTION FOR THOSE MEDIA).

US EPA SEEKS A COURSE OF ACTION WHICH WILL CONTAIN THE GROUNDWATER PLUME AND ALSO RESTORE THE AQUIFER THROUGHOUT TO FEDERAL AND STATE GROUNDWATER STANDARDS. HOWEVER, THE PRESENCE OF THE SURROUNDING WETLANDS POSES A PROBLEM. THESE WETLANDS ARE OF ENVIRONMENTAL SIGNIFICANCE, AND AN OVERLY AGGRESSIVE GROUNDWATER RESTORATION EFFORT MAY HAVE THE UNDESIREd EFFECT OF DRYING OUT AND DESTROYING THESE WETLANDS.

THEREFORE, FOR THIS FIRST OF TWO PLANNED OPERABLE UNITS, THE PRIMARY FOCUS WILL BE TO CONTROL THE SOURCE OF CONTAMINATION (THE LANDFILL) AND CONTAIN KNOWN PORTIONS OF THE CONTAMINATED GROUNDWATER THAT IS LIKELY IN DIRECT CONTACT WITH THE WASTE MATERIALS. BECAUSE THIS IS AN INTERIM GROUNDWATER REMEDY, ATTAINMENT OF FEDERAL/STATE GROUNDWATER CRITERIA THROUGHOUT THE AQUIFER IS NOT A GOAL OF THIS OPERABLE UNIT. FOR GROUNDWATER PROTECTION MEASURES, PERTINENT FEDERAL/STATE REGULATIONS WOULD ENCOMPASS GROUNDWATER RESTORATION CRITERIA, LOCATION-SPECIFIC CONSTRUCTION MEASURES AND EFFLUENT LIMITATIONS UPON TREATMENT. THIS INTERIM MEASURE WILL ATTAIN REGULATIONS ON THE LATTER TWO POINTS. THE GOAL OF THIS ACTION IS CONTAINMENT RATHER THAN TO ATTAIN GROUNDWATER RESTORATION QUALITY STANDARDS.

THE SECOND OPERABLE UNIT WILL CONSIDER AQUIFER RESPONSE AND WETLANDS EFFECTS, AND WILL SEEK TO OPTIMIZE BOTH GROUNDWATER RESTORATION AND WETLANDS PRESERVATION. IT WILL ALSO CONSIST OF AN EXTENSIVE MONITORING SYSTEM TO BETTER EVALUATE THE IMPACT TO THE WETLANDS QUALITY AND BOTH SURFACE WATER QUALITY AND QUANTITY. IT WILL BE THE GOAL OF THE SECOND OPERABLE UNIT TO DEFINE THE REMEDIATION STANDARDS AND THE RESTORATION TIMEFRAME OF THE CONTAMINATED AQUIFER.

THE REMEDY FOR THE FIRST OPERABLE UNIT AT THE MDSL SITE WAS SELECTED BY COMBINING ASPECTS OF SOURCE CONTROL, TREATMENT, AND LONG-TERM MONITORING. THE MDSL SITE RECEIVED PRIMARILY INDUSTRIAL WASTES OF A NON-HAZARDOUS NATURE. WHILE SUCH WASTES CONTAIN HAZARDOUS SUBSTANCES, THEY ARE NOT RCRA HAZARDOUS WASTES, AND WASTE MASS CONTAMINATION IS AT RELATIVELY LOW LEVELS. THEREFORE, THE SELECTED REMEDY FOR THE MDSL SITE INCLUDES A CLAY/SOIL CAP OF THE WASTE MASS WITH AN ACTIVE GAS VENTING SYSTEM AND A GROUNDWATER PUMP AND TREAT SYSTEM TO CONTAIN AND TREAT GROUNDWATER AS WELL AS PREVENT CONTAMINANTS FROM LEAVING THE SITE IN THE SHALLOW ALLUVIUM AQUIFER. A RCRA SUBTITLE C CAP IS NOT TECHNICALLY APPROPRIATE BECAUSE OF CONTACT BETWEEN THE WASTE MASS AND GROUNDWATER. MORE VIGOROUS MEANS OF REDUCING INFILTRATION IS NOT JUSTIFIED BECAUSE SUCH A CAP WOULD NOT PRECLUDE WASTE MASS CONTACT WITH GROUNDWATER. IN ACCORDANCE WITH NR 504.07 AND NR 506.08 WISCONSIN ADMINISTRATIVE CODE, THE CAP/COVER SYSTEM WILL BE COMPOSED OF A MINIMUM 2-FOOT THICK CLAY CAP THAT WILL MINIMIZE WATER FROM INFILTRATING THROUGH THE LANDFILL; COVERED BY A 1-1/2 TO 2-1/2-FOOT THICK SOIL FROST-PROTECTION LAYER; COVERED BY A LAYER OF TOP SOIL AT LEAST 6 INCHES THICK TO PROMOTE VEGETATION GROWTH.

THE CAP WILL BE SLIGHTLY SLOPED TO PROMOTE PRECIPITATION RUNOFF. IN ADDITION, AN ACTIVE VENTING SYSTEM, IN ACCORDANCE WITH WISCONSIN NR 504.05, WILL BE INSTALLED TO REDUCE GAS BUILDUP FROM DECOMPOSITION WITHIN THE LANDFILL, AND TO MONITOR OR CONTROL EMISSIONS FROM THE VENTS. THE SELECTED REMEDY WILL ALSO INCLUDE SITE FENCING, SIGN PLACEMENT, AND SITE DEED RESTRICTIONS. PART OF THE FIRST OPERABLE UNIT WILL BE TO CONDUCT TREATABILITY STUDIES, INCLUDING A PUMP TEST, ON THE GROUNDWATER TO DETERMINE WHICH OF THE COMBINATION ORGANIC/INORGANIC TREATMENT TECHNOLOGIES ARE BEST SUITED FOR THE GROUNDWATER CONTAMINATION TO COMPLY WITH DISCHARGE LIMITATIONS.

KEY DIRECT PATHWAYS AT MDSL ARE CONTACT WITH THE WASTE MASS AS WELL AS INGESTION OF GROUNDWATER IF NO FURTHER ACTION IS TAKEN. THE SELECTED REMEDY WILL ADDRESS THESE THREATS BY CONTAINING THE PLUME OF CONTAMINATED GROUNDWATER, AND BY HALTING DETERIORATION OF EXISTING COVER MATERIALS WHICH COULD RESULT IN SUBSEQUENT EXPOSURE OF THE WASTE MASS. WASTE MATERIALS IN CONTACT WITH THE GROUNDWATER WILL CONTINUE TO IMPACT THE GROUNDWATER, THUS GROUNDWATER CONTAINMENT IS A NECESSARY COMPONENT OF THE OVERALL WASTE MASS CONTAINMENT ALTERNATIVE.

THE GROUNDWATER MEDIUM HAS BEEN IDENTIFIED AS THE PRINCIPAL PATHWAY OF EXPOSURE FROM CHEMICALS AT THE SITE. THE PRIMARY CHEMICALS OF CONCERN ARE AS FOLLOWS: 1,1-DICHLOROETHENE, TRICHLOROETHENE (TCE), CADMIUM, TOLUENE, AND BENZENE. IT SHOULD BE NOTED THAT VINYL CHLORIDE WAS NOT DETECTED IN SAMPLES FROM THE MDSL SITE. HOWEVER, MULTICHLORINATED SPECIES SUCH AS TCE MAY UNDERGO DEGRADATION TO VINYL CHLORIDE.

COMPOUND	MAX. CONC. DETECTED	MAX. CONTAMINANT
		LEVEL (MCL)
1,1-DICHLOROETHENE	28	7
TRICHLOROETHENE	190	5
CADMIUM	15	10
TOLUENE	1100	--
BENZENE	91	5

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5.0 SITE CHARACTERISTICS

THE RI CONSISTED OF SAMPLING AND SUBSEQUENT LABORATORY ANALYSIS TO DETERMINE THE NATURE AND EXTENT OF CONTAMINATION AT THE SITE AND AFFECTED AREAS. DURING THE RI, SAMPLES WERE TAKEN FROM SURFACE AND SUBSURFACE SOILS, MONITORING WELLS, RESIDENTIAL/MUNICIPAL WELLS, SURFACE WATER, AND SEDIMENT. AN ASSESSMENT OF WETLANDS SURROUNDING THE SITE WAS NOT INCLUDED IN THE RI.

GEOPHYSICAL INVESTIGATION OF THE MDSL SITE DID NOT REVEAL AREAS WHICH MAY BE CONSTRUED AS "HOT SPOTS" REQUIRING TREATMENT OF THAT SEGMENT OF THE WASTE MASS. THE LARGEST CLASS OF WASTES AT THE MDSL SITE INCLUDES FOUNDRY SANDS AND SLAGS, ALONG WITH PLASTIC WASTES AND CERTAIN SOLVENTS ASSOCIATED WITH THEIR USAGE. THE RI REPORT FOR THE FIRST OPERABLE UNIT WAS COMPLETED IN JUNE 1990. THE RESULTS OF THE RI ARE SUMMARIZED BELOW.

5.1 GROUNDWATER

EIGHTEEN MONITORING WELLS WERE INSTALLED AT NINE LOCATIONS AROUND THE MDSL SITE. ALL OF THE MONITORING WELLS WERE SCREENED EITHER IN THE SAND AND GRAVEL OR THE DOLOMITE AQUIFERS. FOR MOST OF THE MONITORING WELLS, THREE ROUNDS OF SAMPLING WERE CONDUCTED AND SAMPLES WERE COMPARED TO SAMPLES TAKEN FROM WELLS CONSIDERED UPGRADIENT OF THE SITE. THE SAMPLING REVEALED ELEVATED CONCENTRATIONS OF BOTH ORGANIC AND INORGANIC COMPOUNDS IN BOTH THE SAND AND GRAVEL AND THE DOLOMITE AQUIFERS. THE READER IS REFERRED TO FIGURES 5-1, 5-2 AND 5-3 FOR SAMPLING RESULTS. THE HIGHEST LEVELS OF ORGANIC CONTAMINANTS WERE FOUND IN THE SECOND ROUND OF SAMPLING. DUE TO DROUGHT CONDITIONS THAT EXISTED DURING MOST OF THE RI, THE SECOND ROUND OF SAMPLING OCCURRED DURING MORE TYPICAL WEATHER CONDITIONS.

NO CONTAMINATION ATTRIBUTABLE TO THE MDSL SITE, HOWEVER, WAS FOUND IN THE SEVEN RESIDENTIAL AND TWO MUNICIPAL WELLS SAMPLED.

5.2 SURFACE WATER

DURING THE RI, SAMPLING OF THE FOX RIVER, DREDGE POND AND DRAINAGE CHANNELS SURROUNDING THE LANDFILL WAS CONDUCTED TO DETERMINE WHETHER CONTAMINATION HAD OCCURRED AS A RESULT OF SITE ACTIVITIES. TWO ROUNDS OF SURFACE WATER SAMPLES WERE COLLECTED. ON COMPARING UPSTREAM RIVER AND DRAINAGE CHANNEL RESULTS TO DOWNSTREAM LOCATIONS, IT IS CLEAR THAT THE SITE HAS HAD A DEMONSTRABLE AND DETRIMENTAL EFFECT UPON SURFACE WATER QUALITY. FOR EXAMPLE, AT THE UPSTREAM FOX RIVER SAMPLING POINT, IRON LEVELS WERE 624 AND 597 UG/L FOR THE FIRST AND SECOND ROUNDS OF SAMPLING, RESPECTIVELY. AT A DOWNSTREAM FOX STATION, LOCATED JUST AFTER THE CONFLUENCE WITH THE MAIN DRAINAGE CHANNEL, IRON LEVELS HAD INCREASED TO 842 AND 971 UG/L, FROM THE FIRST TO SECOND ROUNDS OF SAMPLING, RESPECTIVELY. EAST, OR UPGRADIENT OF THE SITE, THE MAIN DRAINAGE CHANNEL SHOWED IRON CONCENTRATIONS OF 633 AND 700 UG/L, RESPECTIVELY. AT A POINT IN THE MAIN DRAINAGE CHANNEL JUST PRIOR TO ENTRY INTO THE FOX RIVER, IRON LEVELS HAD INCREASED TO 1,900 AND 3,090 UG/L, RESPECTIVELY. ADDITIONALLY, AT THIS SAME POINT, A CADMIUM LEVEL OF 44 UG/L WAS DETECTED. CADMIUM WAS NOT DETECTED AT ANY UPSTREAM POINT. THE DETECTED LEVELS OF CADMIUM EXCEED FEDERAL AND STATE AMBIENT WATER QUALITY CRITERIA.

5.3 CONCLUSION

WITH REGARD TO THE CONTAMINANTS AND FIGURES NOTED ABOVE, CARCINOGENIC SUBSTANCES ENCOUNTERED IN THE GROUNDWATER OR SURFACE WATER AT THE MDSL SITE INCLUDE BUT ARE NOT LIMITED TO, BENZENE, ARSENIC, 1,1-DICHLOROETHENE AND TRICHLOROETHENE. THE RI DESCRIBES GROUNDWATER MOVEMENT AS BEING GENERALLY TO THE SOUTH-SOUTHWEST, AND NOTES THAT THERE ARE RESIDENTIAL WELL USERS LOCATED APPROXIMATELY 1 TO 2 MILES AWAY IN THAT DIRECTION. FURTHERMORE, COMPOUNDS SUCH AS 1,1-DICHLOROETHENE AND TRICHLOROETHENE ARE HEAVIER THAN WATER AND MAY IN TIME EXTEND THEIR VERTICAL MIGRATION FURTHER INTO THE DOLOMITE AQUIFER.

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6.0. SUMMARY OF SITE RISKS

AS PART OF THE RI, A BASELINE RISK ASSESSMENT WAS INITIATED TO DETERMINE WHETHER THE CONTAMINANTS OF CONCERN IDENTIFIED AT THE SITE POSE A CURRENT OR POTENTIAL RISK TO HUMAN HEALTH AND THE ENVIRONMENT IN THE ABSENCE OF ANY REMEDIAL ACTION. IT PROVIDES INFORMATION USED IN DETERMINING WHETHER REMEDIAL ACTION IS NECESSARY AND IS ONE JUSTIFICATION FOR PERFORMING REMEDIAL ACTIONS. THE SUPERFUND BASELINE RISK ASSESSMENT PROCESS MAY BE VIEWED AS CONSISTING OF AN EXPOSURE ASSESSMENT COMPONENT AND A TOXICITY ASSESSMENT COMPONENT, THE RESULTS OF WHICH ARE COMBINED TO DEVELOP AN OVERALL CHARACTERIZATION OF RISK. AS INDICATED ABOVE, THESE ASSESSMENTS ARE SITE SPECIFIC AND THEREFORE MAY VARY IN THE EXTENT TO WHICH QUALITATIVE AND QUANTITATIVE ANALYSIS ARE UTILIZED.

THE RISK ASSESSMENT CONCLUDED THAT THE SITE PRESENTLY POSES A RISK TO HUMAN HEALTH THROUGH INGESTION OF CONTAMINATED GROUNDWATER AND, IF UNTREATED, THE CONTAMINATED GROUNDWATER WOULD CONTINUE TO POSE FUTURE RISKS. THE RISK ASSESSMENT CONSIDERED BOTH SOIL INGESTION AND DERMAL CONTACT PATHWAYS AS REGARDS TO ADULT POPULATIONS, BUT DID NOT TAKE INTO ACCOUNT THE USE OF THE SITE BY CHILDREN, AS THE SITE IS PARTIALLY FENCED. HOWEVER, IT SHOULD BE NOTED THAT DIRT BIKE TRACKS WERE FOUND AT THE SITE DURING SUBSEQUENT SITE VISITS, INDICATING THAT CHILDREN MAY HAVE ACCESS TO THE SITE.

6.1 INTRODUCTION

WATER, SOIL AND SEDIMENT SAMPLES WERE ANALYZED FOR CHEMICALS ON THE US EPA TARGET COMPOUND LIST (TCL) AND TARGET ANALYTE LIST (TAL). AS DISCUSSED IN THE RI REPORT, THE RISK ASSESSMENT PROCESS ALLOWS FOR THE MASSIVE LIST OF COMPOUNDS DETECTED AT THE MDSL SITE TO BE PARED DOWN TO A MORE MANAGEABLE LIST OF CHEMICALS OF CONCERN. THE INCLUSION OF EACH CHEMICAL OF CONCERN WAS BASED ON ITS RELATIVE CONCENTRATION, FREQUENCY OF DETECTION, AND TOXIC EFFECTS, AS WELL AS WHETHER AN ENVIRONMENTAL STANDARD NR CRITERIA SUCH AS FEDERAL DRINKING-WATER STANDARD) EXISTS FOR THE CHEMICAL. COMPOUNDS FOUND IN THE UPSTREAM OR UPGRADIENT SAMPLES IN THE SAME FREQUENCY AND MAGNITUDE, OR GREATER, AS THE DOWNSTREAM OR DOWNGRADIENT SAMPLES WERE ELIMINATED FROM THIS ASSESSMENT. INCLUSION OF A COMPOUND ON THE LIST OF CHEMICALS OF CONCERN INDICATES THAT REMEDIAL CONTROLS THAT MAY BE APPLIED TO A SITE SHOULD MITIGATE EXPOSURE TO THE COMPOUND IN GROUNDWATER, SOIL, SURFACE WATER AND SEDIMENTS.

HE CHEMICALS OF CONCERN ARE CLASSIFIED AS NON-CARCINOGENS, OR AS POTENTIAL OR KNOWN HUMAN CARCINOGENS (CANCER-CAUSING AGENTS). ACUTE (SHORT-TERM AT HIGH CONCENTRATIONS) OR CHRONIC (LONG-TERM AT LOW CONCENTRATIONS) EXPOSURE TO EACH OF THE CHEMICALS OF CONCERN LEADS TO VARIOUS TOXIC EFFECTS. THE FOLLOWING

CHEMICALS OF CONCERN WERE SELECTED FOR THE MDSL SITE (USING THE SUPERFUND PUBLIC HEALTH EVALUATION MANUAL (SPHEM; US EPA 1986A)):

CHEMICALS OF CONCERN

INORGANIC

ARSENIC
CADMIUM
CHROMIUM
COPPER
LEAD

ORGANIC

METHYLENE CHLORIDE
1,1-DICHLOROETHENE
TRICHLOROETHENE
BENZENE
TOLUENE
XYLENE

ALL OF THE ABOVE NOTED CHEMICALS WERE FOUND IN GROUNDWATER AND/OR SURFACE WATER AT THE SITE.

6.2 EXPOSURE ASSESSMENT

THE PRIMARY EXPOSURE PATHWAYS OF CONCERN EVALUATED FOR THE MDSL EXPOSURE ASSESSMENT ARE INCIDENTAL INGESTION OF CONTAMINATED SURFACE WATER, INGESTION OF CONTAMINATED FISH, AND GROUNDWATER INGESTION. DERMAL CONTACT WITH SOILS WAS ALSO CONSIDERED IN THIS ASSESSMENT.

THE POTENTIALLY EXPOSED POPULATIONS INCLUDE ADULT AND CHILD GROUNDWATER USERS (VIA DRINKING WATER), FISHERMEN AND OTHER CONSUMERS OF POTENTIALLY CONTAMINATED FISH, AND RECREATIONAL SURFACE WATER USERS WHO MAY INCIDENTALLY INGEST WATER.

THE RISK ASSESSMENT MADE THE FOLLOWING ASSUMPTIONS CONCERNING DURATION AND FREQUENCY OF EXPOSURE, AND CONCENTRATIONS OF POLLUTANTS (NO DIRECT CONTACT WITH THE WASTE MASS WAS ASSUMED):

FOR ADULT CARCINOGENIC RISK ASSOCIATED WITH INGESTING GROUNDWATER:

! 365 DAYS/YEAR FREQUENCY
! 25 YEARS DURATION
! 2 LITERS/DAY

FOR RECREATIONAL USERS OF SURFACE WATER:

! 10 INSTANCES OF EXPOSURE PER YEAR

THE MAXIMUM CONCENTRATIONS AND THE GEOMETRIC MEANS WERE CALCULATED FOR THE CHEMICALS OF CONCERN. FOR WORST CASE CALCULATIONS, THE MAXIMUM CONCENTRATIONS OF A COMPOUND DETECTED WERE ASSUMED TO EQUAL THE EXPOSURE CONCENTRATION. FOR MOST PROBABLE CASES OF EXPOSURE, THE GEOMETRIC MEAN CONCENTRATION OF A POLLUTANT WAS UTILIZED.

THE INGESTION QUANTITY OF FISH WAS ESTIMATED AT 6.5 G/DAY BOTH FOR AN ADULT AND CHILD. THE FRACTION OF THE FISH DIET OBTAINED FROM THE IMMEDIATE VICINITY OF THE LANDFILL WAS ESTIMATED AT 20 PERCENT.

6.3 TOXICITY ASSESSMENT

CANCER POTENCY FACTORS (CPFS) HAVE BEEN DEVELOPED BY USEPA'S CARCINOGENIC ASSESSMENT GROUP FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG/DAY)⁻¹, ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG/DAY, TO PROVIDE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE AT THAT INTAKE LEVEL. THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISKS CALCULATED FROM THE CPF. USE OF THIS APPROACH MAKES UNDERESTIMATION OF THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS TO WHICH ANIMAL-TO-HUMAN EXTRAPOLATION AND UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS).

REFERENCE DOSES (RFDs) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. RFDs, WHICH ARE EXPRESSED IN UNITS OF MG/KG/DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G., THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE RFD. RFDs ARE DERIVED FROM HUMAN EPIDEMIOLOGICAL STUDIES OR ANIMAL STUDIES TO WHICH UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS). THESE UNCERTAINTY FACTORS HELP ENSURE THAT THE RFDs WILL NOT UNDERESTIMATE THE POTENTIAL FOR ADVERSE NONCARCINOGENIC EFFECTS TO OCCUR.

TABLE 4-5 PRESENTS THE SUMMARY OF THE TOXICITY VALUES FOR INGESTION FOR THE CHEMICALS OF CONCERN.

US EPA WEIGHT-OF-EVIDENCE CLASSIFICATION FOR CARCINOGENS ARE AS FOLLOWS:

GROUP A - HUMAN CARCINOGEN (SUFFICIENT EVIDENCE OF CARCINOGENICITY IN HUMANS).

GROUP B - PROBABLE HUMAN CARCINOGEN (B1 - LIMITED EVIDENCE OF CARCINOGENICITY IN HUMANS; B2 - SUFFICIENT EVIDENCE OF CARCINOGENICITY IN ANIMALS WITH INADEQUATE OR LACK OF EVIDENCE IN HUMANS).

GROUP C - POSSIBLE HUMAN CARCINOGEN (LIMITED EVIDENCE OF CARCINOGENICITY IN ANIMALS AND INADEQUATE OR LACK OF HUMAN DATA).

GROUP D - NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY (INADEQUATE OR NO EVIDENCE).

GROUP E - EVIDENCE OF NONCARCINOGENICITY FOR HUMANS (NO EVIDENCE OF CARCINOGENICITY IN ADEQUATE STUDIES).

SUMMARY OF RISK CHARACTERIZATION

EXCESS LIFETIME CANCER RISKS ARE DETERMINED BY MULTIPLYING THE INTAKE LEVEL WITH THE CANCER POTENCY FACTOR. THESE RISKS ARE PROBABILITIES THAT ARE GENERALLY EXPRESSED IN SCIENTIFIC NOTATION (E.G., 1×10^{-6}) MEANS THAT AN INDIVIDUAL HAS AN ADDITIONAL ONE IN ONE MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME UNDER THE SPECIFIC EXPOSURE CONDITIONS AT A SITE).

POTENTIAL CONCERN FOR NONCARCINOGENIC EFFECTS OF A SINGLE CONTAMINANT IN A SINGLE MEDIUM IS EXPRESSED AS THE HAZARD QUOTIENT (HQ) (OR THE RATIO OF THE ESTIMATED INTAKE DERIVED FROM THE CONTAMINANT CONCENTRATION IN A GIVEN MEDIUM TO THE CONTAMINANT'S REFERENCE DOSE). BY ADDING THE HQs FOR ALL CONTAMINANTS WITHIN A MEDIUM OR ACROSS ALL MEDIA TO WHICH A GIVEN POPULATION MAY REASONABLY BE EXPOSED, THE HAZARD INDEX (HI) CAN BE GENERATED. THE HI PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA.

THE REASONABLE WORST CASE HAZARD INDEX WAS CALCULATED AS PART OF THE RISK ASSESSMENT AND WAS CALCULATED TO BE 1.2 FOR ADULTS, BASED PRIMARILY ON THE CONTRIBUTIONS FROM LEAD, TOLUENE AND 1,1-DICHLOROETHENE. A HAZARD INDEX OF GREATER THAN ONE INDICATES AN UNACCEPTABLE RISK. THE WORST CASE HAZARD INDEX CALCULATED FOR CHILDREN AT THE MDSL SITE WAS 4.0. (SEE ASSESSMENT TABLES 5-2 AND 5-3 AS PRESENTED HERE).

THE SUM OF THE CARCINOGENIC RISKS FOR ADULTS AND CHILDREN WERE CALCULATED TO BE 4×10^{-4} AND 1×10^{-3} RESPECTIVELY. THE NCP ESTABLISHED ACCEPTABLE LEVELS OF RISK FOR SUPERFUND SITES AT BETWEEN ONE IN 10,000 AND ONE IN ONE MILLION EXCESS CANCER CASES. THIS TRANSLATES TO A RISK RANGE OF BETWEEN 1×10^{-4} AND 1×10^{-6} . SITE SPECIFIC FACTORS WILL BE USED TO DETERMINE THE LEVEL OF RISK ACCEPTABLE AT A PARTICULAR SITE. THE RISK LEVELS AT THE MASTER DISPOSAL SITE EXCEED THIS RANGE AND, THEREFORE, REQUIRE THAT REMEDIAL ACTION BE TAKEN. (SEE ASSESSMENT TABLES 5-4 AND 5-5 AS PRESENTED HERE).

CALCULATED RISKS AT THE MDSL SITE

	ADULTS	CHILDREN
HAZARD INDEX (HI)	1.2	4.0

(NONCARCINOGENIC)

CARCINOGENIC 4 X (10⁻⁴) 1 X 10⁻³

NOTE: HI GREATER THAN 1 INDICATES AN UNACCEPTABLE RISK. CARCINOGENIC RISK GREATER OR EQUAL TO 1 X (10⁻⁴) EXCEEDS THE NCP UPPER RANGE.

POTENTIAL FUTURE RISKS

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR, THE ENVIRONMENT.

UNCERTAINTIES

THERE ARE A NUMBER OF UNCERTAINTIES EXISTING AT THE SITE WITH RESPECT TO THE EXTENT OF CONTAMINATION SUCH AS THE LACK OF ASSESSMENT INFORMATION ON CONTACT WITH THE WASTE MASS AND DERMAL CONTACT RISK INVOLVING CHILDREN. ADDITIONAL DATA MAY BE GATHERED FOR THE FINAL OPERABLE UNIT THAT ADDRESSES THE WETLANDS, SURFACE WATER AND GROUNDWATER PATHWAYS.

#DSC

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

THE US EPA HAS REVIEWED AND RESPONDED TO ALL RELEVANT COMMENTS RECEIVED FROM THE INTERESTED PARTIES, INCLUDING THOSE FROM THE STATE AND COMMUNITY, DURING THE PUBLIC COMMENT PERIOD. COMMENTS WERE MADE ON THE SELECTED ALTERNATIVES AS WELL AS OTHER REMEDIAL ALTERNATIVES. BASED ON THE PUBLIC COMMENTS, THE US EPA HAS DETERMINED THAT THERE IS NO NEED FOR ANY SIGNIFICANT CHANGES TO WASTE MASS ALTERNATIVE 3 AND GROUNDWATER ALTERNATIVE 3.

IN THE EVENT THAT ADDITIONAL DATA OR INFORMATION DURING THE DESIGN OF THE REMEDY REVEALS THE NEED FOR A MODIFICATION, THE US EPA WILL NOTIFY THE PUBLIC OF ANY CHANGES TO THE REMEDY PRESENTED HERE IN THIS RECORD OF DECISION IN ACCORDANCE WITH APPLICABLE LAW, THE NCP AND USEPA GUIDANCE.

#DA

8.0 DESCRIPTION OF ALTERNATIVES

THE FEASIBILITY STUDY DEVELOPED TWO SETS OF REMEDIATION ALTERNATIVES THAT WERE SUBJECT TO "DETAILED ANALYSIS." FOUR ALTERNATIVES WERE DEVELOPED TO ADDRESS CONTAMINATED GROUNDWATER, AND FIVE ALTERNATIVES ADDRESSED THE LANDFILL ITSELF (REFERRED TO AS "WASTE MASS").

AS NOTED ABOVE, GROUNDWATER WILL BE DEALT WITH IN TWO OPERABLE UNITS OR DISTINCT ACTIONS. THIS ROD ADDRESSES THE FIRST GROUNDWATER OPERABLE UNIT, WHICH IS AN INTERIM ACTION FOR SOURCE CONTROL. IT IS EXPECTED THAT THE REMEDY FOR THE WASTE MASS IN CONJUNCTION WITH SOURCE CONTROL EFFORTS WILL BE A FINAL REMEDY. THE ALTERNATIVES FOR THE MDSL SITE ARE PRESENTED BELOW. TO THE GREATEST DEGREE POSSIBLE, THE INTERIM GROUNDWATER ACTION WILL BE CONSISTENT WITH THE FINAL REMEDY.

WASTE MASS ALTERNATIVES

WASTE MASS ALTERNATIVE 1 (WML) - NO ACTION

THE NATIONAL CONTINGENCY PLAN (NCP) REQUIRES THAT A NO ACTION ALTERNATIVE BE EVALUATED FOR EVERY SITE AS A BASELINE OF COMPARISON FOR THE OTHER ALTERNATIVES. UNDER THIS ALTERNATIVE, NOTHING WOULD BE DONE AT THE SITE REGARDING THE WASTE MASS. THE SITE WOULD CONTINUE TO EXIST IN ITS PRESENT CONDITION.

TIME TO IMPLEMENT:	NONE
CAPITAL COST:	\$ 0.0
ANNUAL O & M COST:	\$ 0.0

TOTAL PRESENT WORTH COST: \$ 0.0

WASTE MASS ALTERNATIVE 2 (WM2) - MONITORING/MAINTENANCE

THIS ALTERNATIVE WOULD CONSIST OF LIMITING ACCESS TO THE SITE, ROUTINE INSPECTION AND MAINTENANCE OF THE EXISTING COVER, CONSISTING OF NATIVE SOILS, AND IMPLEMENTING INSTITUTIONAL CONTROLS (DEED RESTRICTIONS).

MONITORING DURING THIS ALTERNATIVE WOULD INCLUDE INSPECTIONS OF THE LANDFILL COVER AND SECURITY SYSTEMS, AND SAMPLING OF EXISTING WELLS. THE NEED FOR THE INSTALLATION OF ADDITIONAL MONITORING WELLS WOULD BE DETERMINED DURING THE REMEDIAL DESIGN, AND BE INSTALLED AS NECESSARY. DEED RESTRICTIONS WOULD ALERT FUTURE LAND OWNERS OF THE PRESENCE OF HAZARDOUS SUBSTANCES, AND THE PROHIBITION OF EXCAVATION INTO THE WASTE MASS. THIS ALTERNATIVE WOULD ONLY BE CHOSEN IF ACTIVE RESPONSE MEASURES ARE NOT PRACTICABLE, AS SPECIFIED IN THE NCP.

TIME OF IMPLEMENT:	2 MONTHS
CAPITAL COST:	\$ 107,500
ANNUAL O & M COST:	\$ 42,130
TOTAL PRESENT WORTH COST:	\$ 505,000

WASTE MASS ALTERNATIVE 3 (WM3) - CAPPING

THIS ALTERNATIVE PROVIDES FOR THE COVERING OF THE WASTE MASS WITH A CLAY/SOIL CAP. CAPPING WILL REDUCE THE POTENTIAL MIGRATION OF CONTAMINANTS INTO THE GROUNDWATER, PREVENT DIRECT CONTACT WITH THE WASTE MASS, AND REDUCE POTENTIAL IMPACT TO SURFACE WATER BODIES FROM STORMWATER/PRECIPITATION RUN OFF. THE COVER SYSTEM WOULD BE DESIGNED TO MEET STATE OF WISCONSIN SPECIFICATIONS PER THE WISCONSIN ADMINISTRATIVE CODE, NR 504.07 AND NR 506.08. THIS CAP WILL CONSIST OF A GRADING LAYER, A MINIMUM OF TWO FEET OF COMPACTED CLAY, A 1-1/2 TO 2-1/2 FOOT FROST PROTECTION LAYER, AND A MINIMUM OF 6 INCHES OF COVER TOPSOIL. DUST PRODUCTION DURING CONSTRUCTION OF THE CAP WILL BE MINIMIZED. THE CAP CONSTRUCTION WILL BE CONDUCTED TO MINIMIZE WETLANDS IMPACTS. WETLANDS ADVERSELY IMPACTED BY THE REMEDY WILL BE REPAIRED OR MITIGATED. IN ADDITION, AN ACTIVE GAS EXTRACTION SYSTEM WILL BE INSTALLED AS A PART OF THE CAP SYSTEM (SEE FIGURE 8-1).

AFTER INSTALLATION OF THE CAP, THE AREA WOULD BE FENCED, SIGNS ERECTED AND A LONG-TERM MONITORING PROGRAM INITIATED. DEED RESTRICTIONS WOULD BE REQUIRED TO PREVENT FUTURE CONSTRUCTION ON THE PROPERTY. MONITORING AND MAINTENANCE WOULD BE THE SAME AS IN ALTERNATIVE WM2.

TIME TO IMPLEMENT:	6 MONTHS
CAPITAL COST:	\$ 3,495,000
ANNUAL O&M COST:	\$ 54,130
TOTAL PRESENT WORTH COST:	\$ 3,608,000

WASTE MASS ALTERNATIVE 4 (WM4) - IN-SITU VITRIFICATION

THIS ALTERNATIVE WOULD VITRIFY THE ENTIRE WASTE MASS THROUGH THE USE OF A HIGH INTENSITY ELECTRICAL CURRENT. HEAT FROM THE ELECTRIC CURRENT WOULD MELT THE SOIL AND DECOMPOSE ORGANIC MATERIALS. DURING THE PROCESS, METALLIC AND OTHER INORGANICS WOULD DISSOLVE INTO OR ARE ENCAPSULATED IN THE VITRIFIED MASS. GASSES EVOLVED FROM THE MELT WOULD BE RECOVERED BY AN OFF-GAS COLLECTION SYSTEM PLACED OVER THE AREA. THESE OFF GASSES WOULD THEN BE ROUTED THROUGH A SCRUBBER SYSTEM FOR TREATMENT. SCRUBBER EFFLUENT WOULD THEN REQUIRE TREATMENT TO MEET STATE EMISSION STANDARDS PRIOR TO DISCHARGE. TO THE DEGREE POSSIBLE, SUCH TREATMENT COULD BE ACCOMPLISHED AS OUTLINED HEREIN FOR ALTERNATIVES GW3 AND GW4. WHEN THE ELECTRIC CURRENT CEASES, THE MOLTEN MASS COOLS AND SOLIDIFIES INTO A GLASS-LIKE MATERIAL THAT WILL PERMANENTLY RETAIN ITS PHYSICAL AND CHEMICAL INTEGRITY.

APPROXIMATELY 5 TONS PER HOUR WOULD BE EXPECTED ON THE AVERAGE TO BE VITRIFIED. GENERALLY, OPERATIONS ARE CONDUCTED 24-HOURS PER DAY, SEVEN DAYS PER WEEK UTILIZING FOUR CREWS. NORMALLY, ON A LARGE SCALE JOB, AN AREA SELECTED FOR VITRIFICATION IS PROCESSED (VITRIFIED) FOR FOUR DAYS THEN THE EQUIPMENT IS MOVED TO A DIFFERENT LOCATION ON THE SITE (REQUIRING ABOUT 16 HOURS) AND OPERATIONS REINITIATED. GIVEN THE SIZE OF THE SITE (26 ACRES), AND BASED ON THE MOBILIZATION RATE, IT WOULD TAKE WELL OVER 20 YEARS TO COMPLETE THE VITRIFICATION. ONCE THE VITRIFIED MASS COOLS, THE AREA WOULD BE BACKFILLED.

FOLLOWING VITRIFICATION, CONTAMINANT MOBILITY WOULD BE SHARPLY CURTAILED, THEREBY REDUCING RISK ASSOCIATED WITH THE MDSL SITE.

TIME TO IMPLEMENT:	22+ YEARS
CAPITAL COST:	\$ 255,510,000
ANNUAL O&M COST:	\$ 0
TOTAL PRESENT WORTH COST:	\$ 255,510,000

WASTE MASS ALTERNATIVE 5 (WM5) - COMPLETE REMOVAL WITH DISPOSAL AT OFF-SITE LANDFILL

THIS ALTERNATIVE PROVIDES FOR THE COMPLETE EXCAVATION OF THE WASTE MASS AND TRANSPORTATION TO AN APPROVED FACILITY FOR DISPOSAL. DISPOSAL WOULD HAVE TO BE IN ACCORDANCE WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

DURING OPERATIONS, WORKER DERMAL AND RESPIRATORY PROTECTION EQUIPMENT WOULD BE REQUIRED. SPECIAL DUST SUPPRESSION MEASURES WOULD HAVE TO BE IMPLEMENTED TO REDUCE THE POTENTIAL FOR OFF-SITE MIGRATION OF CONTAMINATED PARTICULATE. THE ESTIMATED 668,000 CUBIC YARDS OF WASTE WOULD BE EXCAVATED AND LOADED USING CONVENTIONAL EXCAVATION EQUIPMENT (I.E. DOZERS, BACKHOES AND FRONT-END LOADERS).

DUE TO THE VOLUME OF MATERIAL TO BE DISPOSED OF, THE BULK SOLID WASTE WOULD HAVE TO BE DISPOSED OF AT A NUMBER OF DIFFERENT LANDFILLS. LANDFILL CAPACITY WOULD BE A MAJOR CONCERN IN THIS ALTERNATIVE. IF 60 LOADS WERE DISPATCHED PER DAY, APPROXIMATELY 760 WORK DAYS WOULD BE REQUIRED TO COMPLETE THE EXCAVATION.

TO SUSTAIN A REMOVAL RATE OF 60 LOADS PER DAY, APPROXIMATELY 180 TRUCKS NEED TO BE IN THE LOAD-TRANSPORT-UNLOAD CYCLE.

ALTERNATIVE WM5 INVOLVES "CLEAN CLOSURE" OF THE SITE BY COMPLETELY EXCAVATING WASTES AND LANDFILLING THEM OFF-SITE. MAJOR ENVIRONMENTAL REQUIREMENTS WITH WHICH THIS ALTERNATIVE WOULD HAVE TO COMPLY INCLUDE THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), AND STATE OF WISCONSIN REGULATIONS GOVERNING SOLID WASTE HANDLING AND TRANSPORT.

THE US EPA DOES NOT BELIEVE THAT LAND DISPOSAL RESTRICTIONS (LDRS) ARE AN ARAR FOR THIS SITE, BECAUSE THE CONTAMINANTS PRESENT DO NOT APPEAR TO BE AMONG THOSE SO RESTRICTED. HOWEVER, NO TOXICITY TESTS WERE CONDUCTED ON THE WASTE. IF THIS ALTERNATIVE WERE CHOSEN, HOWEVER, THE WASTES WOULD BE TESTED BY THE TOXIC CONTAMINANT LEACHATE PROCEDURE (TCLP) TO DETERMINE IF THE WASTES ARE HAZARDOUS. COST CALCULATIONS ASSUMED NON-HAZARDOUS WASTES.

TIME TO IMPLEMENT:	3 YEARS
CAPITAL COST:	\$ 142,816,320
ANNUAL O&M COST:	\$ 0
TOTAL PRESENT WORTH COST:	\$ 142,816,320

GROUNDWATER ALTERNATIVES

AS AN INTERIM ACTION FOR GROUNDWATER, AND A COMPONENT OF THE SOURCE CONTROL OPERABLE UNIT, THE REMEDIAL GOAL FOR THE GROUNDWATER REMEDY IN THIS ROD IS TO CONTAIN KNOWN CONTAMINATED GROUNDWATER IN THE SURFICIAL AQUIFER. INFORMATION DERIVED FROM THIS OPERABLE UNIT CONCERNING THE EFFECTS OF A GROUNDWATER EXTRACTION SYSTEM ON THE SURROUNDING WETLANDS AND THE HYDROGEOLOGY OF THE SITE WILL AID IN THE SELECTION OF REMEDY FOR THE FINAL GROUNDWATER OPERABLE UNIT. US EPA COULD EXPECT, THROUGH PUMPING TESTS AND EVALUATION OF CONTAINMENT ACHIEVED BY EXTRACTION WELLS TO LEARN MORE ABOUT AQUIFER RESPONSE. THIS INFORMATION CAN THEN BE UTILIZED TO EVALUATE THE NEED FOR OTHER EXTRACTION COMPONENTS, WETLANDS MITIGATION MEASURES, AND WHETHER EXTRACTION MEASURES SHOULD BE AUGMENTED.

GROUNDWATER ALTERNATIVE 1 (GW1) - NO ACTION

THE NCP REQUIRES THAT A NO ACTION ALTERNATIVE BE EVALUATED FOR EVERY SITE AS A BASELINE OF COMPARISON FOR THE OTHER ALTERNATIVES. UNDER THIS ALTERNATIVE NO WORK WOULD BE DONE AT THE SITE REGARDING THE WASTE MASS OR THE

GROUNDWATER. THE SITE WOULD CONTINUE TO EXIST IN ITS PRESENT CONDITION. RISKS POSED AS NOTED EARLIER IN THIS DOCUMENT WOULD BE UNABATED.

TIME TO IMPLEMENT:	NONE
CAPITAL COST:	\$ 0.0
ANNUAL O&M COST:	\$ 0.0
TOTAL PRESENT WORTH COST:	\$ 0.0

GROUNDWATER ALTERNATIVE 2 (GW2) - MONITORING/MAINTENANCE

THIS ALTERNATIVE WOULD CONSIST OF LONG-TERM FOR AT LEAST 30 YEARS GROUNDWATER MONITORING AND DEED RESTRICTIONS OVER THE AREA OF THE CONTAMINANT PLUME TO PREVENT USE AS A DRINKING WATER SOURCE.

MONITORING DURING THIS ALTERNATIVE WOULD INCLUDE SUCH SAMPLING AS A NETWORK OF EXISTING AND POTENTIAL NEW MONITORING WELLS, SURFACE WATER, AND WETLANDS. THE NEED FOR THE INSTALLATION OF ADDITIONAL MONITORING WELLS WOULD BE DETERMINED DURING THE REMEDIAL DESIGN. DEED RESTRICTIONS WOULD ALERT FUTURE LAND OWNERS OF THE PRESENCE OF HAZARDOUS SUBSTANCES AND THE PROHIBITION OF INSTALLATION OF RESIDENTIAL WELLS INTO THE CONTAMINATED GROUNDWATER PLUME. HOWEVER, COMPLIANCE WITH SUCH RESTRICTIONS CANNOT BE ASSURED. RISKS POSED AS NOTED EARLIER IN THIS DOCUMENT WOULD BE UNABATED. PERTINENT REGULATIONS TO BE ATTAINED BY THIS ALTERNATIVE INCLUDE FEDERAL/STATE REGULATIONS ON PROPER LANDFILL POST-CLOSURE MONITORING.

TIME TO IMPLEMENT:	2 MONTHS
CAPITAL COST:	\$ 107,500
ANNUAL O&M COST:	\$ 42,130
TOTAL PRESENT WORTH COST:	\$ 505,000

GROUNDWATER ALTERNATIVE 3 (GW3) - GROUNDWATER EXTRACTION WELL SYSTEMS

THIS ALTERNATIVE CONSISTS OF A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM FOR THE PURPOSE OF PLUME CONTAINMENT, AS PART OF SOURCE CONTROL WITH DISCHARGE OF TREATED GROUNDWATER TO THE FOX RIVER. WITHIN THIS ALTERNATIVE, THE FOLLOWING FOUR TREATMENT TECHNOLOGIES WILL BE DISCUSSED:

!	AIR STRIPPING
!	CARBON ADSORPTION
!	ION-EXCHANGE
!	CHEMICAL TREATMENT

TREATABILITY STUDIES DURING THE REMEDIAL DESIGN WILL DETERMINE THE APPROPRIATE TECHNOLOGY OR COMBINATION OF TECHNOLOGIES FOR GROUNDWATER TREATMENT. THE TECHNOLOGY SELECTED MUST COMPLY WITH DISCHARGE LIMITS AS WELL AS BEST DEVELOPED AVAILABLE TECHNOLOGY (BDAT) FOR THIS TYPE OF DISCHARGE. ATTACHMENT A INDICATES THE EFFLUENT LIMITATIONS THAT THE SYSTEM MUST MEET FOR SURFACE WATER DISCHARGE BASED ON NR 102, NR 105, NR 106 AND NR 207 OF THE WISCONSIN ADMINISTRATIVE CODE.

THE EXTRACTION SYSTEM ITSELF WILL BE DESIGNED TO PUMP GROUNDWATER HYDRAULICALLY DOWNGRADIENT OF THE WASTE MASS AND UPGRADIENT OF THE FOX RIVER TO PREVENT DISCHARGE OF THE CONTAMINANT PLUME INTO THE WETLANDS AND RIVER. THE NUMBER OF EXTRACTION WELLS, LOCATION, DEPTHS AND AVERAGE EXTRACTION RATES WILL BE DETERMINED DURING THE REMEDIAL DESIGN STAGE. THE PUMP SYSTEM WILL BE DESIGNED TO CONTAIN CONTAMINATED GROUNDWATER EMANATING FROM THE SITE WHILE NOT HAVING A NEGATIVE IMPACT ON THE WETLANDS. IF WETLAND IMPACTS OCCUR, MITIGATION OF WETLANDS WILL BE NECESSARY.

IN ADDITION TO THE GROUNDWATER EXTRACTION AND TREATMENT SYSTEM, THIS ALTERNATIVE WOULD INCLUDE CONTINUOUS EXTENSIVE GROUNDWATER MONITORING, TEMPORARY DEED RESTRICTIONS OVER THE AREA OF THE CONTAMINANT PLUME, ASSESSMENT OF THE EFFECTS OF THE INTERIM REMEDY ON THE SURROUNDING WETLANDS, AND LONGTERM OPERATION AND MAINTENANCE OF THE EXTRACTION SYSTEM.

THE PRESENCE OF 1,1-DICHLOROETHENE AND TRICHLOROETHENE, BECAUSE OF THEIR ABILITY TO SINK, MAY POSE A LONG-TERM CHALLENGE TO CLEANING UP THE AQUIFER. THE SECOND OPERABLE UNIT WILL ADDRESS POTENTIAL PROBLEMS

ASSOCIATED WITH AQUIFER CLEAN UP US EPA ESTIMATES THAT 1 TO 2 YEARS OF OPERATION OF THIS ALTERNATIVE WOULD GENERATE SUFFICIENT INFORMATION IN ORDER TO REACH A DECISION ON COMPONENTS OF A FINAL OPERABLE UNIT REGARDING GROUNDWATER AND IMPACT TO WETLANDS.

COSTS FOR EACH OF THE TECHNOLOGIES HAVE BEEN ESTIMATED. THE FOLLOWING IS A DISCUSSION OF EACH OF THE GROUNDWATER TREATMENT TECHNOLOGIES WITH THEIR RESPECTIVE COSTS.

GROUNDWATER COLLECTION WITH ON-SITE AIR STRIPPING FOLLOWED BY DISCHARGE

FOLLOWING RECOVERY, THE GROUNDWATER WOULD BE PUMPED THROUGH A FILTER SYSTEM TO REMOVE SUSPENDED PARTICULATES THAT COULD CAUSE OPERATIONAL PROBLEMS AND DECREASE SYSTEM EFFICIENCIES (UNSERVICEABLE FILTER ELEMENTS OR BACKWASH FROM CLEANING FILTERS MUST BE COLLECTED AND PROPERLY DISPOSED OF). EFFLUENT FROM THE FILTER SYSTEM WOULD BE INJECTED AT THE TOP OF A PACKED AIR STRIPPER COLUMN. TREATED EFFLUENT IN COMPLIANCE WITH STATE NPDES REQUIREMENTS, WOULD PASS THROUGH AN EFFLUENT MONITORING STATION AND THEN BE PIPED TO AN OUTFALL AT A DRAINAGE CHANNEL ADJACENT TO THE SITE.

MONITORING WOULD BE PERFORMED AT THE OUTSET OF OPERATIONS TO DEFINE EFFLUENT VARIABILITY AND TO ASSURE COMPLIANCE WITH REQUIRED LIMITS. AN AIR QUALITY RISK ASSESSMENT MAY BE REQUIRED AS PART OF THIS ALTERNATIVE.

IF VOLATILE AIR EMISSIONS EXCEED STANDARDS, EMISSION CONTROLS WILL BE REQUIRED TO BE IN COMPLIANCE WITH NR 445 WISCONSIN ADMINISTRATIVE CODE. ANY ADDITIONAL REQUIREMENTS NECESSARY AS PART OF CHAPTER 144.391 AND 144.393 PERTAINING TO NON-ATTAINMENT AREAS WOULD ALSO NEED TO BE MET. IN ADDITION, THE SUBSTANTIVE REQUIREMENTS OF A WISCONSIN POLLUTANT DISCHARGE EFFLUENT STANDARDS (WPDES) PERMIT WOULD HAVE TO BE MET PRIOR TO DISCHARGING THE EFFLUENT TO THE DRAINAGE CHANNEL. OPERATION AND MAINTENANCE COSTS ARE PROJECTED OVER A THIRTY YEAR PERIOD.

TIME TO IMPLEMENT:	1 YEAR
CAPITAL COST:	\$ 183,300
ANNUAL O&M COST:	\$ 88,600
TOTAL PRESENT WORTH COST:	\$ 1,024,000

GROUNDWATER COLLECTION WITH ON-SITE CARBON ADSORPTION FOLLOWED BY DISCHARGE

FOLLOWING RECOVERY, THE GROUNDWATER WOULD BE PUMPED THROUGH A FILTER SYSTEM TO REMOVE SUSPENDED PARTICULATES THAT COULD CAUSE OPERATIONAL PROBLEMS (E.G., PLUGGING OF THE CARBON BED). (NOTE: PLUGGED FILTER ELEMENTS OR BACKWASH FROM CLEANING FILTERS MUST BE COLLECTED AND PROPERLY DISPOSED OF). EFFLUENT FROM THE FILTRATION UNIT WOULD FLOW TO CARBON ADSORPTION UNITS (ONE TO SERVE AS A SPARE DURING CARBON REPLACEMENT). TREATED EFFLUENT WOULD BE DISCHARGED TO THE DRAINAGE CHANNEL ADJACENT TO THE SITE.

THE SUBSTANTIVE REQUIREMENTS OF A WPDES PERMIT WOULD HAVE TO BE MET PRIOR TO DISCHARGING THE EFFLUENT TO THE DRAINAGE CHANNEL. EFFLUENT MONITORING/ANALYSIS WOULD BE NEEDED.

TIME TO IMPLEMENT:	1 YEAR
CAPITAL COST:	\$ 195,000
ANNUAL O&M COST:	\$ 91,400
TOTAL PRESENT WORTH COST:	\$ 1,063,000

GROUNDWATER COLLECTION WITH ON-SITE ION-EXCHANGE TREATMENT FOLLOWED BY DISCHARGE

THIS SYSTEM WOULD BE IDENTICAL TO THE AIR STRIPPING OR CARBON ADSORPTION SYSTEM EXCEPT THAT IN LIEU OF THE STRIPPER OR CARBON ADSORPTION UNIT A FIXED-BED, COUNTER-CURRENT ION EXCHANGE UNIT WOULD BE UTILIZED.

AS WITH THE OTHER SYSTEMS, THE TREATED EFFLUENT WOULD BE DISCHARGED TO THE DRAINAGE CHANNEL ADJACENT TO THE SITE. PRIOR TO DISCHARGE, THE SUBSTANTIVE REQUIREMENTS OF A WPDES PERMIT WOULD HAVE TO BE MET.

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WHEN EXHAUSTED, THE RESIN WOULD BE REGENERATED BY BACKWASHING. THE BACKWASH WOULD BE STORED FOR OFF-SITE DISPOSAL.

TIME TO IMPLEMENT:	1 YEAR
CAPITAL COST:	\$ 293,800
ANNUAL O&M COST:	\$ 110,000
TOTAL PRESENT WORTH COST:	\$ 1,337,000

GROUNDWATER COLLECTION WITH ON-SITE CHEMICAL TREATMENT FOLLOWED BY DISCHARGE

RECOVERED GROUNDWATER WOULD BE PUMPED TO A PH ADJUSTMENT TANK WHERE LIME WOULD BE ADDED TO RAISE THE PH. TANK THE LIQUID WOULD FLOW TO A MIXING TANK WHERE FLOCCULATING POLYMERS WOULD BE ADDED AND MIXED. THE LIQUID WOULD THEN BE PUMPED TO A SEDIMENTATION TANK WHERE THE FLOCCULATED SOLIDS WOULD SETTLE OUT AND BE REMOVED FOR DISPOSAL AT AN OFF-SITE FACILITY. THE TREATED EFFLUENT WOULD FLOW TO A TANK FOR FINAL PH ADJUSTMENT PRIOR TO RELEASE TO THE DRAINAGE CHANNEL ADJACENT TO THE SITE.

SINCE THIS SYSTEM WOULD BE EFFECTIVE ONLY FOR INORGANIC COMPOUNDS, IT WOULD HAVE TO BE INTEGRATED WITH OTHER TREATMENT SYSTEMS TO ADDRESS ORGANIC CONTAMINANTS. THE SUBSTANTIVE REQUIREMENTS OF A WPDES DISCHARGE PERMIT MUST BE MET PRIOR TO INITIATION OF TREATMENT.

TIME TO IMPLEMENT:	1 YEAR
CAPITAL COST:	\$ 430,300
ANNUAL O&M COST:	\$ 103,070
TOTAL PRESENT WORTH COST:	\$ 1,408,000

GROUNDWATER ALTERNATIVE 4 (GW4) - GROUNDWATER COLLECTION WITH BARRIER

THIS ALTERNATIVE WOULD INVOLVE THE DESIGN AND IMPLEMENTATION OF A GROUNDWATER EXTRACTION SYSTEM WITH A BARRIER SYSTEM 4,076 FEET LONG INSTALLED AROUND THE PERIMETER OF THE LANDFILL. THIS BARRIER SYSTEM WOULD BE ANCHORED TO A SOIL LAYER APPROXIMATELY 40 FEET BELOW THE GROUND'S SURFACE OR TO THE DOLOMITE BEDROCK LAYER. THIS BARRIER WOULD BE EITHER A SLURRY WALL, COMPOSED OF A MIXTURE OF LOW-PERMEABLE CLAY AND SOIL, OR WOULD BE MADE OF OTHER MATERIAL. THE BARRIER WOULD PREVENT UNCONTAMINATED GROUND WATER FROM MOVING THROUGH AND FROM THE LANDFILL AND BECOMING CONTAMINATED. THE CONTAMINATED GROUNDWATER WITHIN THE BARRIER WOULD BE EXTRACTED AND TREATED. THE PROJECTED COST FOR THIS ALTERNATIVE WOULD BE UP TO \$1.8 MILLION, IN ADDITION TO THE COST OF WELL INSTALLATION AND TREATMENT, DESCRIBED ABOVE.

TIME TO IMPLEMENT:	1 YEAR	CAPITAL COST (BARRIER ONLY):	\$1,983,112	ANNUAL O&M COST (BARRIER ONLY):	\$ 88,000
TOTAL PRESENT WORTH COST:	\$3,100,000 (BARRIER + GW TREATMENT)				

#SCAA

9.0. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

THE ALTERNATIVES ARE EVALUATED AGAINST THE NINE CRITERIA RECOMMENDED BY US EPA (US EPA, 1987). THE CRITERIA ARE AS FOLLOWS:

- 1) OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT ADDRESSES WHETHER OR NOT AN ALTERNATIVE PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS ARE ELIMINATED, REDUCED OR CONTROLLED THROUGH TREATMENT AND ENGINEERING OR INSTITUTIONAL CONTROLS.
- 2) COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) ADDRESSES WHETHER OR NOT AN ALTERNATIVE WILL MEET ALL OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OR PROVIDE GROUNDS FOR INVOKING A WAIVER.
- 3) LONG-TERM EFFECTIVENESS AND PERMANENCE REFERS TO THE ABILITY OF AN ALTERNATIVE TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT, OVER TIME, ONCE CLEANUP OBJECTIVES HAVE BEEN MET.
- 4) REDUCTION OF TOXICITY, MOBILITY, OR VOLUME IS THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES AN ALTERNATIVE MAY EMPLOY.
- 5) SHORT-TERM EFFECTIVENESS INVOLVES THE PERIOD OF TIME NEEDED TO ACHIEVE PROTECTION AND ANY ADVERSE IMPACTS

ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD UNTIL CLEANUP OBJECTIVES ARE ACHIEVED.

6) IMPLEMENTABILITY IS THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF AN ALTERNATIVE, INCLUDING THE AVAILABILITY OF GOODS AND SERVICES NEEDED TO IMPLEMENT THE SOLUTION.

7) COST INCLUDES CAPITAL COSTS, AS WELL AS OPERATION AND MAINTENANCE COSTS.

8) STATE ACCEPTANCE INDICATES WHETHER, BASED ON ITS REVIEW OF THE RI/FS AND PROPOSED PLAN, WDNR AGREES ON THE PREFERRED ALTERNATIVE.

9) COMMUNITY ACCEPTANCE INDICATES THE PUBLIC SUPPORT OF A GIVEN ALTERNATIVE. THIS CRITERIA IS DISCUSSED IN THE RESPONSIVENESS SUMMARY.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE NO ACTION AND MONITORING/MAINTENANCE ALTERNATIVES (WM1, WM2, GW1, GW2) ARE NOT PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT BECAUSE THEY DO NOT ELIMINATE, REDUCE OR CONTROL RISKS THROUGH VARIOUS COMBINATIONS OF TREATMENT AND ENGINEERING CONTROLS AND/OR INSTITUTIONAL CONTROLS. TAKING NO ACTION TO ADDRESS THE GROUNDWATER WOULD ALLOW UNABATED, UNMONITORED MOVEMENT OF CONTAMINANTS WHOSE INGESTION POSES AN UNACCEPTABLE RISK. THE NO ACTION ALTERNATIVES ARE ALSO UNACCEPTABLE BECAUSE THE EXISTING SITE COVER IS SHOWING SIGNS OF DISREPAIR AND EROSION, WHICH MAY INCREASE HUMAN CONTACT WITH THE CONTAMINANTS. FURTHER, THE ALTERNATIVES ALSO WOULD NOT PROTECT THE SURFACE WATER AND WETLANDS FROM CONTINUED DETERIORATION. THE MONITORING/MAINTENANCE ALTERNATIVES ARE NOT PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THEY MAY REDUCE THE POTENTIAL FOR HUMAN CONTACT WITH SITE CONTAMINANTS AND PORTIONS OF THESE ALTERNATIVES MAY BE A COMPONENT OF OTHER ALTERNATIVES, THEY WOULD NOT STOP THE DETERIORATION OF THE LANDFILL COVER OR HALT THE MOVEMENT OF THE GROUNDWATER CONTAMINATION. AS THE NO ACTION AND MONITORING/MAINTENANCE ALTERNATIVES DO NOT PROVIDE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT, IT IS NOT ELIGIBLE FOR SELECTION AND SHALL NOT BE DISCUSSED FURTHER IN THIS DOCUMENT.

ALTERNATIVES WM3, WM4, AND WM5 ALL PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT BY REDUCING CONTAMINANTS MOVING INTO THE GROUNDWATER, AND BY REDUCING HUMAN CONTACT WITH THE WASTE MASS. CONTAMINANT MOVEMENT WOULD BE REDUCED BY EITHER CAPPING, IN-SITU-VITRIFICATION, OR EXCAVATION AND REMOVAL OF THE WASTE MASS.

ALTERNATIVES GW3 AND GW4 ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THEY WOULD NOT NECESSARILY ELIMINATE ALL RELEASES; HOWEVER, THEY WOULD CONTAIN SUCH RELEASES. THEREFORE, THESE ALTERNATIVES ARE CONSIDERED PROTECTIVE. BOTH OF THESE ALTERNATIVES WOULD COLLECT AND TREAT CONTAMINATED GROUNDWATER TO STATE-ESTABLISHED EFFLUENT LIMITATIONS FOLLOWED BY DISCHARGE TO A SURFACE WATER BODY. ONE OF SEVERAL GROUNDWATER TREATMENT METHODS WOULD BE CHOSEN DURING THE REMEDIAL DESIGN. THE TREATMENT METHODS TO BE CONSIDERED INCLUDE: ON-SITE AIR STRIPPING; ON-SITE CARBON ADSORPTION; ON-SITE ION-EXCHANGE; AND ON-SITE CHEMICAL TREATMENT. ALTERNATIVE GW4 WOULD UTILIZE A BARRIER SYSTEM IN CONJUNCTION WITH THE RECOVERY SYSTEM. THESE 2 ALTERNATIVES, AT PRESENT, ARE NOT INTENDED TO RESTORE GROUNDWATER TO FEDERAL AND STATE STANDARDS.

ALTERNATIVES WM3, WM4, AND WM5 WILL PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME. THE GROUNDWATER ALTERNATIVES GW3 AND GW4 WILL PROVIDE ADEQUATE PROTECTION PARTICULARLY WITH RESPECT TO SHORT-TERM IMPACT.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

SARA REQUIRES THAT REMEDIAL ACTIONS MEET LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) OF OTHER ENVIRONMENTAL LAWS. THESE LAWS MAY INCLUDE: THE SAFE DRINKING WATER ACT, THE CLEAN AIR ACT, THE CLEAN WATER ACT, THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), AND ANY STATE LAW WHICH HAS STRICTER REQUIREMENTS THAN THE CORRESPONDING FEDERAL LAW.

A "LEGALLY APPLICABLE" REQUIREMENT IS ONE WHICH WOULD LEGALLY APPLY TO THE RESPONSE ACTION IF THAT ACTION WERE NOT TAKEN PURSUANT TO SECTIONS 104, 106 OR 122 OF CERCLA. A "RELEVANT AND APPROPRIATE" REQUIREMENT IS

ONE THAT, WHILE NOT "APPLICABLE," IS DESIGNED TO APPLY TO PROBLEMS SUFFICIENTLY SIMILAR AND THAT THEIR APPLICATION IS APPROPRIATE.

WASTE MASS ALTERNATIVES 3,4, AND 5 WILL COMPLY WITH ALL APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL AND STATE ENVIRONMENTAL STANDARDS. THE GROUND WATER INTERIM ACTION WOULD NEED TO COMPLY WITH ONLY THOSE ACTION-SPECIFIC AND CHEMICAL-SPECIFIC ARARS ASSOCIATED WITH THE TECHNOLOGIES. UTILIZED FOR GROUND WATER COLLECTION, TREATMENT, DISCHARGE, AND RESIDUALS MANAGEMENT. AS PROVIDED FOR IN EPA,S "GUIDANCE ON REMEDIAL ACTIONS FOR CONTAMINATED GROUND WATER AT SUPERFUND SITES (OSWER DIRECTIVE NO. 9283.1-2; DECEMBER 1988)," "CLEAN-UP LEVELS FOR THE SITE TYPICALLY ARE NOT ESTABLISHED SINCE INTERIM ACTIONS ARE NOT FINAL. THUS, AN INTERIM GROUND-WATER ACTION NEED NOT ACHIEVE CHEMICAL-SPECIFIC ARARS IN GROUNDWATER." THEREFORE NO CHEMICAL-SPECIFIC CLEANUP STANDARDS WILL BE ESTABLISHED AT THIS TIME FOR THE EXISTING CONTAMINANT PLUME. THE FINAL OPERABLE UNIT FOR GROUND WATER AT THIS SITE WILL ENSURE THAT THE FEDERAL CLEAN-UP STANDARDS OR THE MORE STRINGENT STATE OF WISCONSIN GROUND WATER QUALITY STANDARDS ESTABLISHED IN CHAPTER 160, WISCONSIN STATUTES, AND CHAPTER NR 140, WAC WILL BE COMPLIED WITH FOR THE ENTIRE SITE, OR JUSTIFICATION PROVIDED IF EITHER THE FEDERAL OR STATE STANDARDS ARE WAIVED.

LONG-TERM EFFECTIVENESS AND PERMANENCE

THE ALTERNATIVES CONSIDERED FOR THE MDSL SITE VARY IN THEIR ABILITY TO PROVIDE LONG-TERM EFFECTIVENESS AND PERMANENCE.

WASTE MASS ALTERNATIVE 4 (WM4) PROVIDES THE GREATEST DEGREE OF PERMANENCE. IN-SITU VITRIFICATION OF THE WASTE MASS WOULD MELT THE SOIL AND DECOMPOSE ORGANIC WASTES. WHEN THE MASS COOLED, METALLIC AND OTHER INORGANIC SUBSTANCES WOULD BE TRAPPED IN THE GLASS-LIKE MASS.

WASTE MASS ALTERNATIVE 5 (WM5) WOULD OFFER A SOMEWHAT HIGHER DEGREE OF PERMANENCE THAN WM3. WM5 CONSISTS OF EXCAVATION OF THE ENTIRE WASTE MASS AND DISPOSAL OF IN THREE RCRA PERMITTED FACILITIES, WHICH OFFER MORE RIGOROUS PROTECTION AGAINST INFILTRATION THAN WM3. THE WASTE MASS WOULD BE LANDFILLED WITHOUT TREATMENT. HOWEVER, OFF-SITE DISPOSAL OF WASTES WITHOUT TREATMENT IS DEFINED IN SARA AS A LEAST PREFERRED ALTERNATIVE.

ALTERNATIVE WM3 SHOULD PROVIDE AN EFFECTIVE, LONG-TERM METHOD FOR PREVENTING INFILTRATION TO OR CONTACT WITH THE WASTE MASS IF THE COVER IS PROPERLY MAINTAINED. THE CLAY/SOIL CAP WOULD BE CONSTRUCTED IN ACCORDANCE WITH THE WISCONSIN ADMINISTRATIVE CODE, NR 504.07 AND NR 506.08. IT WOULD CONSIST OF A MINIMUM TWO FOOT THICK CLAY CAP WITH A MINIMUM 1.5 TO 2.5 FOOT THICK FROST PROTECTION LAYER AND A FINAL SOIL COVER LAYER FOR VEGETATION.

GROUNDWATER ALTERNATIVES GW3 AND GW4 PROVIDE THE SAME AMOUNT OF PROTECTION. BOTH OF THESE GROUNDWATER ALTERNATIVES CONSIST OF A GROUNDWATER RECOVERY SYSTEM FOLLOWED BY TREATMENT OF THE GROUNDWATER TO STATE-ESTABLISHED EFFLUENT LIMITATIONS. ALTERNATIVE GW4 PROVIDES A BARRIER IN CONJUNCTION WITH THE GROUNDWATER RECOVERY/TREATMENT SYSTEM, WHICH TAKES INTO CONSIDERATION THE LONG-TERM IMPACT EXTRACTION MAY HAVE ON THE RIVER AND WETLANDS.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

THE ONLY WASTE MASS ALTERNATIVE THAT REDUCES THE TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT IS IN-SITU VITRIFICATION (WM4). IN-SITU VITRIFICATION MELTS THE WASTE MASS AND SOLIDIFIES IT INTO A GLASS-LIKE STRUCTURE.

THE OTHER TWO WASTE MASS ALTERNATIVES DO NOT PROVIDE TREATMENT OF THE WASTE MASS AND THEREFORE DO NOT MEET THIS CRITERIA. A CLAY/SOIL CAP IS NOT CONSIDERED TO BE TREATMENT, NOR IS EXCAVATION AND DISPOSAL TO AN OFF-SITE LANDFILL.

BOTH OF THE GROUNDWATER ALTERNATIVES ARE EXPECTED TO REDUCE THE TOXICITY AND POSSIBLY MOBILITY OF GROUNDWATER CONTAMINANTS THROUGH TREATMENT. BOTH ALTERNATIVES CONSIST OF A GROUNDWATER RECOVERY SYSTEM IN CONJUNCTION WITH TREATMENT TO STATE-ESTABLISHED EFFLUENT LIMITATIONS. NEITHER GW3 NOR GW4 WOULD ADDRESS THE FULL EXTENT OF GROUNDWATER CONTAMINATION FROM THIS SITE.

SHORT-TERM EFFECTIVENESS

ALTERNATIVE WM3 WOULD REQUIRE APPROXIMATELY 6 MONTHS TO IMPLEMENT AND SHOULD EFFECTIVELY PREVENT CONTACT WITH CONTAMINANTS WITHIN TWO MONTHS OF INITIATION. THERE IS THE POTENTIAL FOR SITE PERSONNEL TO BE EXPOSED THROUGH DIRECT CONTACT WITH MATERIALS DURING INITIAL CLEANUP ACTIVITIES, ALTHOUGH THESE EXPOSURES COULD BE REDUCED BY FOLLOWING STANDARD HEALTH AND SAFETY AND EMISSION CONTROL PROCEDURES. ALTERNATIVE WM5 IS EXPECTED TO REQUIRE AT LEAST 3 YEARS TO IMPLEMENT, BUT SHOULD RESULT IN A FAIRLY RAPID REMOVAL OF EXPOSURE PATHWAYS TO THE PUBLIC, EXCEPT FOR THE INCREASED OPPORTUNITY OF AIRBORNE EMISSIONS DURING EXCAVATION AND TRANSPORT. THESE POTENTIAL EXPOSURES WOULD BE REDUCED BY INSTITUTING PROPER HEALTH AND SAFETY PROCEDURES. EXPOSURE FROM TRANSPORTATION OF MATERIALS OFF SITE ALSO MAY BE A CONCERN. ALTERNATIVE WM4, HOWEVER, WOULD NOT BE EFFECTIVE IN THE SHORT TERM. IT COULD REQUIRE UP TO 22 YEARS TO IMPLEMENT, DURING WHICH TIME EXPOSURE ROUTES TO HUMANS AND THE ENVIRONMENT WOULD REMAIN.

ALTERNATIVES GW3 AND GW4 ARE ESTIMATED TO HAVE A 1 YEAR INSTALLATION TIME FOR THE EXTRACTION AND TREATMENT SYSTEM. THE SPECIFIC SHORT-TERM EFFECTIVENESS OF THESE ALTERNATIVES WOULD DEPEND ON THE TREATMENT SYSTEM CHOSEN DURING THE REMEDIAL DESIGN.

THE GROUNDWATER RECOVERY SYSTEM COULD HAVE ADVERSE IMPACTS ON THE SURROUNDING WETLANDS IF THE EXTRACTION RATE EXCEEDS THE GROUNDWATER RECHARGE RATE. IN ADDITION, THIS SYSTEM COULD HAVE IMPACTS ON THE RIVER AND EFFLUENT STANDARDS FOR DOWNSTREAM DISCHARGERS BECAUSE IT IS A WASTE LOAD ALLOCATED RIVER. THE BARRIER ASSOCIATED WITH GROUNDWATER ALTERNATIVE 4 COULD HAVE A SUBSTANTIAL ADVERSE IMPACT ON THE SURROUNDING WETLANDS DEPENDING ON CONSTRUCTION TECHNIQUES USED TO IMPLEMENT IT.

IMPLEMENTABILITY

WHILE ALL OF THE ALTERNATIVES CONSIDERED ARE IMPLEMENTABLE, SOME ALTERNATIVES ARE TECHNICALLY EASIER TO IMPLEMENT THAN OTHERS, BASED ON THEIR DESIGN AND COMPLEXITY.

ALTERNATIVE WM3 COULD BE READILY IMPLEMENTED BECAUSE THE TECHNOLOGY FOR LANDFILL CAPPING IS WELL ESTABLISHED. ALTERNATIVES WM4 AND WM5 PRESENT SERIOUS IMPLEMENTATION DIFFICULTIES. THERE ARE RELATIVELY FEW VENDORS THAT OFFER THE TECHNOLOGY THAT COMPRISES ALTERNATIVE WM4; THIS WOULD DELAY IMPLEMENTATION. WHILE IN-SITU VITRIFICATION HAS BEEN SELECTED AS A REMEDY ON OTHER SITES IN REGION V, NO PROJECT APPROACHES THE MAGNITUDE OF MATERIAL PROPOSED FOR TREATMENT IN THIS FASHION AS AT THE MDSL SITE. ALTERNATIVE WM5 POSES POTENTIAL DIFFICULTY IN OBTAINING SUFFICIENT LANDFILL CAPACITY TO DISPOSE OF THE WASTE MASS, AND IMPLEMENTATION ALSO MAY BE DELAYED. AS NOTED IN SECTION 8 OF THIS DOCUMENT, THE SHEER LOGISTICS OF DEDICATING A LARGE FLEET OF TRUCKS (180) TO THIS PROJECT WILL BE DIFFICULT TO IMPLEMENT.

ALTERNATIVES GW3 AND GW4 SHOULD BE READILY IMPLEMENTABLE BECAUSE THE TECHNOLOGY FOR GROUNDWATER RECOVERY AND TREATMENT IS WELL ESTABLISHED. THE NEED TO CONDUCT TREATMENT STUDIES BEFORE THE SYSTEM IS IMPLEMENTED MAY CAUSE SOME DELAY. THE BARRIER ASSOCIATED WITH ALTERNATIVE GW4 MAY NOT BE EASILY IMPLEMENTABLE DUE TO POTENTIAL DETRIMENTAL IMPACTS THE CONSTRUCTION MAY HAVE ON THE SURROUNDING WETLAND AREAS.

COST

THE ESTIMATED PRESENT WORTH VALUE OF EACH ALTERNATIVE AND OPTION IS AS FOLLOWS:

WASTE MASS ALTERNATIVES

WM3	\$ 3,608,000
WM4	\$ 255,510,000
WM5	\$ 142,816,320

GROUNDWATER ALTERNATIVES

GW3	\$ 2,000,000
GW4	\$ 3,800,000

STATE ACCEPTANCE

WDNR CONCURS ON THE SELECTED FINAL AND INTERIM REMEDIES PRESENTED IN THIS ROD. THE WDNR PREDICATES THIS CONCURRENCE ON THE INTERIM NATURE OF THE RESPONSE ACTION PLANNED FOR THE GROUNDWATER AND THE IMPLEMENTATION OF MEASURES REQUIRED TO MITIGATE IMPACTS TO THE WETLANDS THE GROUNDWATER ACTION MAY HAVE.

COMMUNITY ACCEPTANCE

COMMUNITY ACCEPTANCE OF THE PREFERRED ALTERNATIVE WILL BE DISCUSSED IN THE RESPONSIVENESS SUMMARY IN THIS RECORD OF DECISION.

#SR

10.0 SELECTED REMEDY

BASED ON THE FINDINGS OF THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY, AND THE EVALUATION OF THE NINE CRITERIA, US EPA AND WDNR HAVE IDENTIFIED THE COMBINATION OF CAPPING, LANDFILL GAS VENTING (WASTE MASS ALTERNATIVE WM3) AND GROUNDWATER EXTRACTION WELL SYSTEMS AND TREATMENT (GROUNDWATER ALTERNATIVE GW3) TO BE THE PREFERRED ALTERNATIVES. THESE ALTERNATIVES INVOLVE A COMBINATION OF SITE CAPPING AND GROUND-WATER EXTRACTION WITH THE CAPABILITY TO REMOVE BOTH INORGANIC AND ORGANIC POLLUTANTS, FOLLOWED BY DISCHARGE OF THE TREATED GROUNDWATER. THE COMBINED COST OF THESE TWO ALTERNATIVES IS APPROXIMATELY \$6 MILLION.

BASED ON THE INFORMATION AVAILABLE AT THIS TIME, US EPA AND WDNR BELIEVE THAT THE SELECTED REMEDIES WOULD BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, WOULD ATTAIN ARARS, AND WOULD BE COST EFFECTIVE. THESE ACTIONS USE PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

WETLANDS

THE CONCERN FOR THE WELFARE OF THE WETLANDS SURROUNDING THE MDSL SITE IS THE PRIMARY REASON FOR THE INTERIM GROUND WATER REMEDY APPROACH FOR THIS FIRST OPERABLE UNIT. THE POTENTIAL FOR AN OVERLY AGGRESSIVE GROUND WATER EXTRACTION SYSTEM ADVERSELY IMPACTING THE WETLANDS EXISTS IN LARGE MEASURE. THE GOAL FOR THE INTERIM GROUND WATER REMEDY IS TO CONTAIN THE GROUND WATER CONTAMINANT PLUME TO PREVENT ITS DISCHARGE INTO THE FOX RIVER WITH MINIMAL ADVERSE IMPACT TO THE SURROUNDING WETLANDS. DURING THE OPERATIVE LIFE OF THE INTERIM GROUND WATER REMEDY COMPONENT, THE WETLANDS SURROUNDING THE SITE WILL BE MONITORED TO DETERMINE ANY. CHANGES IN CONDITIONS. PRIOR TO IMPLEMENTATION OF THE GROUND WATER REMEDY, DELINEATION AND INVENTORY OF THE WETLANDS WILL BE UNDERTAKEN.

IT IS EXPECTED THAT THIS MONITORING EFFORT WILL EMPHASIZE DELINEATION OF THE WETLAND-UPLAND BOUNDARY, AS OPPOSED TO THE LOWER BOUNDARY BETWEEN WETLANDS AND AQUATIC HABITATS. IN CONDUCTING SUCH MONITORING, IT WILL LIKELY BE IMPORTANT TO CONSIDER FREQUENCY OF OCCURRENCE OF HYDROPHYTIC VEGETATION (SUCH AS OBLIGATE WETLAND PLANTS), SOILS WHICH ARE SATURATED OR PONDED FREQUENTLY ENOUGH SUCH THAT THEY DEVELOP ANAEROBIC CONDITIONS, AND HYDROLOGY OF THE AREA UNDER CONSIDERATION.

AT ANY POINT DURING THE OPERATION OF THE GROUND WATER EXTRACTION SYSTEM WHERE IT HAS BEEN DETERMINED THAT THE WETLANDS HAVE BEEN ADVERSELY IMPACTED, THE SYSTEM WILL BE SHUT DOWN AND REEVALUATED FOR FURTHER ACTION.

SOURCE CONTROL

SOURCE CONTROL IS A PRIMARY REMEDIAL GOAL FOR THIS FIRST OPERABLE UNIT. CAPPING OF THE WASTE MASS IS A COMPONENT IN THE EFFORT OF SOURCE CONTROL. IT IS BELIEVED THAT PORTIONS OF THE WASTE MASS ARE IN CONTACT WITH THE GROUND WATER TABLE. CONSEQUENTLY, GROUND WATER CONTAMINATION WILL CONTINUE TO EMANATE FROM THE WASTE MASS TO SOME DEGREE. THE INTERIM GROUND WATER REMEDY COMPONENT WILL ALSO FUNCTION AS A COMPONENT OF SOURCE CONTROL.

AFTER A PERIOD OF MONITORING THE PERFORMANCE OF THE FIRST OPERABLE UNIT, ADDITIONAL SOURCE CONTROL MEASURES MAY INVOLVE THE CONSTRUCTION OF AN UPGRADIENT CUT-OFF WALL TO THE LANDFILL. THE CAP FOR THE WASTE MASS WILL NOT BE AFFECTED BY ANY ADDITIONAL MEASURES CONTEMPLATED. IT SHOULD BE POINTED OUT THAT IN CIRCUMSTANCES OF EXTREME FLOODING EVENTS, THE CAP AND WASTE MASS MAY BE SUBJECT TO EROSION.

THIS WILL BE MONITORED INDEFINITELY OVER THE LIFETIME OF THE REMEDY.

#SD

11.0 STATUTORY DETERMINATIONS

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

BASED ON THE RISK ASSESSMENT DEVELOPED FOR THE SITE, DERMAL CONTACT WITH THE WASTE MASS, INGESTION OF CONTAMINATED GROUNDWATER, INCIDENTAL INGESTION OF CONTAMINATED SURFACE WATER AND INGESTION OF CONTAMINATED FISH ARE IDENTIFIED AS THE PRIMARY RISKS WITH THE SITE. IMPLEMENTATION OF THE CLAY/SOIL CAP AND AN ACTIVE VENTING SYSTEM IN ACCORDANCE WITH WISCONSIN ADMINISTRATIVE CODE NR 504.07 AND NR 506.08 WILL SERVE TO REDUCE GROUNDWATER INFILTRATION AND ELIMINATE THE POTENTIAL FOR DERMAL CONTACT WITH THE WASTE MASS. THE INTERIM GROUNDWATER RECOVERY AND TREATMENT SYSTEM WILL CONTAIN THE GROUNDWATER PLUME THEREBY PREVENTING FURTHER MIGRATION OF THE CONTAMINANT PLUME. THE SELECTED REMEDY SHOULD ASSIST IN IMPROVING SURFACE WATER QUALITY NEAR THE SITE.

THE SELECTED REMEDY ATTAINS ARARS

THE WASTE MASS ALTERNATIVE, CLAY/SOIL CAP, WILL MEET OR ATTAIN ALL APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL AND STATE REQUIREMENTS DIRECTLY ASSOCIATED WITH THE ACTIONS. THE INTERIM GROUNDWATER ALTERNATIVE WILL MEET THE ARARS PERTINENT TO THE SCOPE AND PURPOSE OF THE INTERIM ACTION.

THE FOLLOWING IS A DESCRIPTION OF THE ENVIRONMENTAL LAWS WHICH ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO DIFFERENT COMPONENTS OF THE REMEDY.

CLAY/SOIL CAP

REGULATIONS ARE FOUND IN CHAPTER NR 504 OF THE WISCONSIN ADMINISTRATIVE CODE, WHICH GOVERNS SOLID WASTE DISPOSAL FACILITIES WHICH DID NOT ACCEPT HAZARDOUS WASTES AFTER 1980. WHILE BOTH SOLID AND HAZARDOUS WASTE REGULATIONS ARE POTENTIAL ARARS, IT WAS DETERMINED THAT AN NR 504.07 CAP PROVIDES ADEQUATE PROTECTION. SUBTITLE C LANDFILL REQUIREMENTS, WHILE RELEVANT WERE DETERMINED NOT TO BE APPROPRIATE. IT IS LIKELY THAT WASTE IS IN CONTACT WITH THE GROUNDWATER, MAKING A SYNTHETIC CAP INEFFECTIVE IN MINIMIZING LEACHING. IN ADDITION, BECAUSE LARGE VOLUMES OF NON-HAZARDOUS INDUSTRIAL WASTES AND SOME MUNICIPAL WASTES WERE DISPOSED OF AT MDSL, A LARGE AMOUNT OF SETTLING WILL CONTINUE TO OCCUR DUE TO DECOMPOSITION OF WASTES, MAKING THE SYNTHETIC MEMBRANE SUBJECT TO DAMAGE OVER THE LONG TERM. SECTION NR 504.07 SEEKS TO MINIMIZE INFILTRATION BY SPECIFYING CLAY TYPE, SLOPE AND TOPSOIL REQUIREMENTS FOR A FINAL COVER FOR THE LANDFILL. THE REGULATIONS REQUIRE A GAS VENTING SYSTEM, TO RELIEVE GAS BUILD-UP BENEATH THE CAP (NR 445, NR 504.07, NR 506, NR 508, NR 514.07 WIS. ADM. CODE). FURTHERMORE, WISCONSIN STATUTE CHAPTER 160 AND CHAPTER NR 140, WAC INDICATE THAT FOR FINAL ACTION ONE MUST PREVENT THE CONTINUED RELEASE OF CONTAMINANTS TO GROUNDWATER, AT OR ABOVE STATE GROUNDWATER QUALITY STANDARDS.

GROUNDWATER EXTRACTION AND TREATMENT

AS DISCUSSED PREVIOUSLY, THE GROUNDWATER REMEDY IS AN INTERIM AND NOT A FINAL REMEDY. THE PURPOSE OF THIS INTERIM REMEDY IS TO CONTAIN THE PLUME OF CONTAMINATED GROUNDWATER WHILE US EPA, IN CONSULTATION WITH THE STATE OF WISCONSIN, DETERMINES HOW BEST TO ADDRESS THE GROUNDWATER CONTAMINATION WHILE MAXIMIZING PROTECTION OF THE WETLANDS. BECAUSE RESTORATION OF THE AQUIFER IS NOT A GOAL OF THIS OPERABLE UNIT, THE INTERIM GROUNDWATER REMEDY WILL NOT MEET ALL ARARS, SPECIFICALLY NATIONAL PRIMARY AND SECONDARY DRINKING WATER STANDARDS (40 CFR 141, 143) AND WISCONSIN GROUNDWATER QUALITY STANDARDS (NR 140, WIS. STATS. WIS. ADM. CODE). AFTER GAINING SOME EXPERIENCE WITH THIS INTERIM REMEDY, THE ISSUE OF AQUIFER RESTORATION WILL BE ADDRESSED AND THESE ARARS WILL ADDRESSED IN THE FINAL ROD.

GROUNDWATER WHICH IS EXTRACTED, TREATED AND SUBSEQUENTLY DISCHARGED MUST MEET THE SUBSTANTIVE REQUIREMENTS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES, 40 CFR 122, 125) AND THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES). DISCHARGE OF TREATED GROUNDWATER TO THE DRAINAGE CHANNELS ADJACENT TO THE SITE, AND ULTIMATELY TO THE FOX RIVER, SHALL MEET THE SUBSTANTIVE REQUIREMENTS OF SECTION 402 OF THE CLEAN WATER ACT AND SHALL NOT EXCEED DISCHARGE LIMITS ESTABLISHED BY THE STATE OF WISCONSIN (NR 102, NR 105,

NR 106, AND NR 207 WIS. ADM. CODE). GROUNDWATER EXTRACTION AND MONITORING WILL BE DONE IN COMPLIANCE WITH WISCONSIN GROUNDWATER MONITORING AND RECOVERY REQUIREMENTS (NR 141, NR 181, WIS. ADMIN. CODE) EFFLUENT LIMITATIONS ARE NOTED IN ATTACHMENT A.

IF GROUNDWATER TREATMENT OCCURS THROUGH AIR STRIPPING, AIR EMISSIONS MUST NOT EXCEED THE LIMITS SET BY US EPA (40 CFR 50, 61) AND THE STATE OF WISCONSIN (NR 404, NR 415, NR 445 WIS. ADM. CODE).

FLOODPLAIN WETLANDS POLICY

US EPA HAS A FLOODPLAIN AND WETLANDS POLICY WHICH REGULATES CONSTRUCTION IN A FLOODPLAIN (SIMILAR TO RCRA 40 CFR 270.14(B)(II)(IV) AND FILLING OF WETLANDS (40 CFR 230). IMPACTS TO BOTH THE WETLANDS AND FLOODPLAIN WILL BE CONSIDERED AND MINIMIZED TO THE MAXIMUM EXTENT POSSIBLE DURING THE DESIGN PHASE OF THIS OPERABLE UNIT AS DIRECTED IN EXECUTIVE ORDER 11990 AND 11988, RESPECTIVELY. THE STATE OF WISCONSIN ALSO HAS POLICIES ON PROTECTION OF WETLANDS (NR 1.95, NR 115, NR 117 WIS. ADM. CODE), PROTECTION OF LAKES AND STREAMS (NR 102, NR 103 WIS. ADM. CODE), AND FLOODPLAIN MANAGEMENT (NR 116 WIS. ADM. CODE). ASSESSMENT OF FLOODPLAIN IMPACTS WILL BE UNDERTAKEN DURING THE REMEDIAL DESIGN PHASE.

THE FOLLOWING ARARS ARE ASSOCIATED WITH THE PREFERRED REMEDY CHOSEN IN THIS ROD:

CHEMICAL SPECIFIC

- ! WATER QUALITY CRITERIA (AWQC). 40 CFR PART 131 QUALITY CRITERIA FOR WATER, 1986.
- ! SURFACE WATER QUALITY STANDARDS (NR 102, NR 105, NR 106 WIS. ADM. CODE)
- ! PROHIBITION OF AIR CONTAMINANTS WHICH ADVERSELY AFFECT HUMAN HEALTH AND THE ENVIRONMENT (NR 404, NR 415, NR 445 WIS. ADM. CODE)

ACTION SPECIFIC

- ! NATIONAL POLLUTANT DISCHARGE ELIMINATION (40 CFR PART 125); INCLUDES BEST AVAILABLE TECHNOLOGY.
- ! STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE (40 CFR PART 262), TREATMENT RESIDUALS GENERATION.
- ! STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES, (40 CFR 264.90-101), SUBPART F.
- ! GROUNDWATER MONITORING AND RECOVERY WELL REQUIREMENTS (NR 141, NR 181, WIS. ADM. CODE).
- ! REQUIREMENTS AND STANDARDS FOR POLLUTION DISCHARGE SYSTEMS (NR 108, NR 102, NR 104, NR 200, NR 207, NR 218, NR 219, NR 220 WIS. ADM. CODE).
- ! STANDARDS FOR LANDFILL CAP DESIGN (NR 181, NR 504 WIS. ADM. CODE); NR 181.48 FOR "OTHER" FACILITIES.
- ! STANDARDS FOR EMISSIONS CONTROLS (NR 400-499 ADM. CODE) WIS.
- ! REQUIREMENTS FOR COLLECTION AND CONTROL OF LANDFILL GAS (NR 504, NR 506, NR 508, NR 181 WIS. ADM. CODE).
- ! STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE (NR 181 WIS. ADM. CODE).
- ! RESOURCE CONSERVATION AND RECOVERY ACT (RCRA 42 USC. 6924(U), (V) AND 6928(H)).

LOCATION SPECIFIC

- ! PROTECTION OF WETLANDS (EXEC. ORDER NO. 11,990, 40 CFR 6.302(A) AND APPENDIX A).
- ! GUIDELINES FOR SPECIFICATIONS OF DISPOSAL SITES FOR DREDGED OR FILL MATERIAL (40 CFR 230).
- ! FLOODPLAIN MANAGEMENT (EXEC. ORDER NO. 11,988, 40 CFR 6.302(B) AND APPENDIX A; CWA SECT. 404).
- ! PROTECTION OF WETLANDS (NR 1.95, NR 115, NR 117 ADM. CODE) WIS.
- ! PROTECTION OF LAKES AND STREAMS (NR 102, 103 CODE) WIS. ADM.
- ! FLOODPLAIN MANAGEMENT (NR 116 WIS. ADM. CODE).

THE SELECTED REMEDY IS COST EFFECTIVE

WASTE MASS ALTERNATIVE 3 (WM3) AND GROUNDWATER ALTERNATIVE 3 (GW3) REPRESENT A COST-EFFECTIVE REMEDY FOR THE MDSL SITE. WASTE MASS ALTERNATIVE 3, CLAY/SOIL CAPPING OF THE WASTE MASS, WILL REDUCE THE AMOUNT OF LEACHATE PRODUCTION IN THE FILL, THUS REDUCING POTENTIAL FOR GROUNDWATER CONTAMINATION. WASTE MASS ALTERNATIVE 4, IN-SITU VITRIFICATION, AND ALTERNATIVE 5, COMPLETE REMOVAL OF THE WASTE MASS, COMPARE HIGHLY UNFAVORABLY TO WM3 IN TERMS OF CAPITAL COST.

GROUNDWATER ALTERNATIVE 3, AN EXTRACTION WELL SYSTEM WITH A COMBINATION ORGANIC/INORGANIC TREATMENT SYSTEM, AND ALTERNATIVE 4, GROUNDWATER COLLECTION WITH A BARRIER, ARE BOTH COST-EFFECTIVE REMEDIES. BOTH ALTERNATIVES WILL CONTAIN THE GROUNDWATER PLUME. SINCE ALTERNATIVE 3 WILL BE LESS DISRUPTIVE TO THE WETLANDS AREA SURROUNDING THE SITE, US EPA AND WDNR HAVE CHOSEN IT AS THE PREFERRED GROUNDWATER ALTERNATIVE.

THE SELECTED REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

US EPA AND WDNR BELIEVE THE SELECTED REMEDY REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT SOLUTIONS AND TREATMENT TECHNOLOGIES CAN BE UTILIZED IN A COST-EFFECTIVE MANNER FOR THE WASTE MASS REMEDY AT THE MDSL SITE. OF THE ALTERNATIVES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLY WITH ARARS, US EPA AND THE STATE HAVE DETERMINED THAT THE SELECTED REMEDY PROVIDES THE BEST BALANCE OF TRADEOFFS IN TERMS OF LONG-TERM EFFECTIVENESS AND PERMANENCE, REDUCTION IN TOXICITY, MOBILITY OR VOLUME ACHIEVED THROUGH TREATMENT, SHORT-TERM EFFECTIVENESS, IMPLEMENTABILITY, COST, AS WELL AS SATISFYING THE STATUTORY PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT AND CONSIDERING STATE AND COMMUNITY ACCEPTANCE.

SINCE CAPPING THE WASTE MASS WILL NOT ACHIEVE A REDUCTION IN TOXICITY, MOBILITY OR VOLUME, THE MAJOR TRADE OFFS THAT PROVIDE THE BASIS FOR THIS SELECTION DECISION ARE LONG-TERM EFFECTIVENESS, SHORT-TERM EFFECTIVENESS, IMPLEMENTABILITY, AND COST. LONG-TERM EFFECTIVENESS AND IMPLEMENTABILITY WERE KEY FACTORS IN SELECTING THIS REMEDY. WASTE MASS ALTERNATIVE 3 CAN BE IMPLEMENTED AND COMPLETED QUICKER WITH LESS DIFFICULTY AND AT LESS COST THAN THE OTHER ALTERNATIVES CONSIDERED. WASTE MASS ALTERNATIVE 3 IS THEREFORE CONSIDERED TO BE THE MOST APPROPRIATE SOLUTION TO CONTAMINATION AT THE SITE.

NEITHER OF THE GROUNDWATER INTERIM REMEDIES WILL MEET SHORT TERM EFFECTIVENESS. BOTH OF THESE ALTERNATIVES WILL MEET ALL OF THE REMAINING CRITERIA, WITH ALTERNATIVE GW3 BEING SLIGHTLY MORE COST EFFECTIVE THAN GW4. GROUNDWATER ALTERNATIVE 3 IS CONSIDERED TO BE THE MOST APPROPRIATE SOLUTION FOR AN INTERIM REMEDY BECAUSE IT WILL BE LEAST DISRUPTIVE TO THE SURROUNDING WETLANDS. THE SHORT-TERM EFFECTIVENESS CRITERION WAS A KEY FACTOR IN SELECTING THIS REMEDY.

THE SELECTED REMEDY REDUCES TOXICITY, MOBILITY, OR VOLUME OF WASTE MATERIALS AS A PRINCIPAL ELEMENT. TREATMENT OF THE WASTE MASS TO PERMANENTLY AND SIGNIFICANTLY REDUCE TOXICITY, MOBILITY, OR VOLUME OF CONTAMINANTS WAS NOT FOUND TO BE PRACTICABLE OR COST EFFECTIVE FOR REMEDIATION OF THE SITE. THE SELECTED INTERIM GROUNDWATER ALTERNATIVE, HOWEVER, SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT OF THE PRINCIPAL THREAT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE TOXICITY OF CONTAMINANTS BY OXIDATION AND ADSORPTION OF ORGANIC AND INORGANIC HAZARDOUS SUBSTANCES.